GRADUATE STUDIES
2008/2009 CALENDAR

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Smoke Free/Scent Free Dalhousie

To protect people from involuntary exposure to tobacco smoke, Dalhousie has declared the University entirely smoke-free. Smoking is not permitted in University buildings, including residences, or on University property. Those wishing to smoke are asked to leave University property to do so.

The University has also acted to support its many students and employees who report that they are harmed when they are exposed to scents which are present in many scented personal care products. Scents in perfume, cologne, hair-spray, after-shave, and even some soap and fabric softeners, cause serious illness in people who are sensitive to these chemicals. To provide an environment which supports teaching and learning, Dalhousie asks students, staff, faculty and visitors, to refrain from using such scented products while at the University. The scent reduction program is part of a broader effort to limit, to the fullest extent practical, exposure to all chemicals in our buildings.

For more information on the Smoking Policy and the Scent Reduction Program, contact the Safety Office by email at Safety.Office@dal.ca or consult the websites www.dal.ca/scentfree and www.dal.ca/smokefree.

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Important Notices

Students are advised that the matters dealt with in this Calendar are subject to continuing review and revision. This Calendar is printed some months before the year for which it is intended to provide guidance. Students are further advised that the content of this calendar is subject to change without notice, other than through the regular processes of Dalhousie University, and every student accepted for registration in the University shall be deemed to have agreed to any such deletion, revision or addition whether made before or after said acceptance. Additionally, students are advised that this calendar is not an all-inclusive set of rules and regulations but represents only a portion of the rules and regulations that will govern the student's relationship with the University. Other rules and regulations are contained in additional publications that are available to the student from the registrar's office, and/or the relevant faculty, department or school.

The University reserves the right to limit enrolment in any program. Students should be aware that enrolment in many programs is limited and that students who are admitted to programs at Dalhousie are normally required to pay deposits on tuition fees to confirm their acceptance of offers of admission. These deposits may be either non-refundable or refundable in part, depending on the program in question. While the University will make every reasonable effort to offer classes as required within programs, prospective students should note that admission to a degree or other program does not guarantee admission to any given class. Students should select optional classes early in order to ensure that classes are taken at the most appropriate time within their schedule. In some fields of study, admission to upper level classes may require more than minimal standing in prerequisite classes.

Dalhousie University does not accept any responsibility for loss or damage suffered or incurred by any student as a result of suspension or termination of services, classes or courses caused by reason of strikes, lockouts, riots, weather, damage to university property or for any other cause beyond the reasonable control of Dalhousie University.

Inquiries should be directed to:

The Registrar

Dalhousie University
Halifax, Nova Scotia
Canada B3H 4H6
Telephone: (902) 494-2450
Fax: (902) 494-1630
E-mail: Registrar@dal.ca

Dalhousie Calendars on the Web

Dalhousie University calendars are available in electronic form on the Web at www.registrar.dal.ca. Please note that the electronic versions of the calendars are provided for your convenience. Formatting of the electronic version may differ from the official printed version. Where differences occur, please contact the Registrar's office at registrar@dal.ca

Other Programs

Information on programs offered by the Faculties of Architecture and Planning, Arts and Social Sciences, Computer Science, Engineering, Health Professions, Management, and Science can be found in the Undergraduate calendar. Information on programs offered by the Faculties of Dentistry, Law, and Medicine can be found in the Dentistry, Law, Medicine Calendar.

Academic Dates 2008/2009

ACADEMIC CLASS ADD/DROP DATES (For financial deadlines and refund dates, visit www.dal.ca/studentaccounts.)				
Part of Term Identifier	Duration of Classes	Last Day to Register	Last Day for Late Registration Last Day to Cancel Registration Last Day to Add Classes	Last Day to Drop without "W" Last Day to Change from Audit to Credit and Vice Versa
Summer Term 2008				
1	May 5 - Aug 1, 2008	May 16, 2008	May 16, 2008	June 4, 2008
A	May 12 - June 27, 2008	May 7, 2008	May 23, 2008	May 27, 2008
D	May 12 - June 4, 2008	May 7, 2008	May 19, 2008	May 23, 2008
9	June 2 - August 27, 2008	May 23, 2008	June 23, 2008	July 8, 2008
E	June 5 - June 27, 2008	May 23, 2008	June 12, 2008	June 13, 2008
B	July 2 - August 15, 2008	June 25, 2008	July 7, 2008	July 16, 2008
F	July 2 - July 25, 2008	June 25, 2008	July 7, 2008	July 9, 2008
G	July 28 - August 20, 2008	June 25, 2008	August 5, 2008	August 7, 2008
Fall Term 2008				
X/Y	September 4, 2008 - April 9, 2009	September 2, 2008	September 19, 2008	November 3, 2008
2	September 4, - December 1, 2008	September 2, 2008	September 19, 2008	October 3, 2008
Winter Term 2009				
2	January 5 - April 9, 2009	January 16, 2009	January 16, 2009	February 2, 2009
Summer Term 2009				
1	May 4 - July 31, 2009	May 15, 2009	May 15, 2009	June 3, 2009
A	May 11 - June 26, 2009	May 6, 2009	May 22, 2009	May 26, 2009
D	May 11 - June 3, 2009	May 6, 2009	May 19, 2009	May 22, 2009
9	June 1 - August 26, 2009	May 22, 2009	June 22, 2009	July 7, 2009
E	June 4 - June 26, 2009	May 22, 2009	June 11, 2009	June 12, 2009
B	July 2 - August 14, 2009	June 24, 2009	July 6, 2009	July 15, 2009
F	July 2 - July 24, 2009	June 24, 2009	July 6, 2009	July 8, 2009
G	July 27 - August 19, 2009	June 24, 2009	August 4, 2009	August 6, 2009

Other Academic Dates

2008

May

5 Summer Academic term begins, commerce
19 Victoria Day - University closed
20-28 May - Spring Convocations

July

1 Canada Day - University closed
2 Last day to apply to graduate in October
18 Last day for those expecting PhD degrees in October to submit one unbound copy of completed thesis (the External Examiner's copy) and submission form to Graduate Studies and four unbound copies of thesis to department

August

4 Halifax/Dartmouth Natal Day - University closed
15 Last day for those expecting Masters degrees in October to submit unbound theses to department
22 Last day to have Leave of Absence approved by Graduate Studies for September

September

1 Labour Day - University closed
4 Classes begin, fall term
5 Last day for those expecting to receive graduate degrees in October to submit approved unbound copies of theses to Faculty of Graduate Studies

October

13 Thanksgiving Day - University closed
18-19 Fall convocations

November

11 Remembrance Day - University closed
14 Last day to apply to graduate in May
Last day to apply for admission to winter term

December

1 Classes end, fall term
1 Last day to apply to graduate in May
3 Examinations begin
12 Last day to have Leave of Absence beginning in January approved by Graduate Studies
13 Examinations end
16 Last day to submit approved, unbound theses to Graduate Studies for those registered in the fall term only

2009

January
1 New Year's Day - University closed
5 Classes begin, winter term

February
6 Munro Day - University closed
13 Last day for those expecting PhD degrees in May to submit one unbound copy of completed thesis (the External Examiner's copy) and submission form to Graduate Studies and four unbound copies of thesis to department
23 Study break begins

March
2 Classes resume
13 Last day for those expecting Masters degrees in May to submit unbound theses to department

April
7 Last day for those expecting to receive graduate degrees in May to submit approved unbound copies of theses to Faculty of Graduate Studies
9 Classes end unless otherwise indicated
10 Good Friday - University Closed
13 Examinations begin, regular session
17 Last day to have Leave of Absence approved by Graduate Studies for May
27 Examinations end, regular session

May
18 Victoria Day - University closed
19-27 Spring convocations

July
1 Canada Day - University closed
2 Last day to submit Intent to Graduate Form for October graduation
17 Last day for those expecting PhD degrees in October to submit one unbound copy of completed thesis (the External Examiner's copy) and submission form to Graduate Studies and four unbound copies of thesis to department

August
3 Halifax/Dartmouth Natal Day - University closed
14 Last day to have Leave of Absence approved by Graduate Studies for September
Last day for those expecting Masters degrees in October to submit unbound theses to department

Admission Dates 2008/2009

Final Dates for Receipt of Applications for Admission

Regular Session - September Start Date

- **Graduate Studies**[1,2] (except as below) June 1
- Non-Canadian Students (Graduate Studies) April 1

Several programs have different application deadlines. **Please refer to the specific departmental sections in the calendar for these dates**

[1] All supporting documentation must be submitted by the appropriate deadline.
[2] For **Graduate Studies Scholarship** consideration applications must be complete (including application, fee and all supporting documents) by **March 1**. For consideration for **Killam and other University scholarships**, complete applications must be received by **January 31**.

Admission in January or May

Some programs allow for a student to start either January 1 or May 1. Check the detailed program descriptions or with the department directly to see if such start dates are permitted. See Faculty Regulation 3.2, page 21 for appropriate application deadlines.

General Application Deadlines	Canadian Applicants	Non-Canadian Applicants
For September Admission	June 1	April 1
For January Admission	October 31	August 31
For May Admission	February 28	December 31

Definitions

The following definitions are intended to facilitate an understanding of the calendar and not to define all words and phrases used in the calendar which may have specific meanings.

Academic Dismissal
A student's required withdrawal from a program due to unsatisfactory academic performance. Please refer to Faculty of Graduate Studies Regulation 4.2.4, page 22.

Academic Program
A distinct group of classes and other requirements which lead to eligibility for a degree or other university-awarded credential.

Academic Sessions
Fall term: September - December
Winter term: January - April
Summer term: May - August
Regular session: September - April

Audit Student
A student permitted to attend classes but not expected to prepare assignments, write papers, tests or examinations. Credit is not given nor is a mark awarded for classes. Classes appear on the transcript with the notation "Aud". Audit students must apply in the normal way. Students may register to audit a class only after the last day to add classes in the term.

Class
A unit of instruction in a particular subject identified by a name and number.

Clerkship
See Internship

Clinical Practice
See Internship

Continuing Fees
The tuition fees charged to graduate students who have fulfilled their program fee requirements but have yet to complete all their degree requirements. See Faculty of Graduate Studies Regulation 4.3.5, page 23.

Co-operative Education
A program where academic study is combined with career related work experience.

Co-requisite
Requirement which must be fulfilled concurrently with the class being considered.

Course
The term "class" is used in place of the word course.

Credit
A unit by which University class work is measured. A full year class, i.e. September - April, is normally worth one full credit.

Credit Hours
One full credit is equal to six credit hours and one half credit is equal to three credit hours.

CRN (Class Registration Number)
Each class has a CRN attached to it (class registration number). This number is to be used when registering for classes.

Email
E-mail is an authorized means of communication for academic and administrative purposes within Dalhousie. The University will assign all students an official e-mail address. This address will remain in effect while the student remains a student and for one academic term following a student's last registration. This is the only e-mail address that will be used for communication with students regarding all academic and administrative matters. Any redirection of e-mail will be at the student's own risk. Each student is expected to check her or his official e-mail address frequently in order to stay current with Dalhousie communications.

Exclusion
Students may not register for a class which lists, as an exclusion, a class the student is also taking or has already passed.

Externship
See Internship.

Fieldwork
See Internship.

Full-time Students
Those registered for three half credit classes or more in a term.

Graduate Student (Regular)
A student with a Bachelor's degree, usually with Honours or equivalent, enrolled in a Master's or Doctoral program, or a graduate diploma program.

Internship, Fieldwork, Clinical Practice, Externship, Practicum, Clerkship
Practical professional educational experiences that are conducted in a non-university setting such as a health or social service agency.

Letter of Permission
A Letter of Permission authorizes a Dalhousie student to take a class(es) at another institution for credit towards a Dalhousie qualification. Such permission must be obtained in advance of taking the class(es). See Regulation 6.6.6., page 27

Non-thesis Program
A Master's program of study based on class work which may also include a research project. This includes many of the professional graduate programs. Some of these programs also offer a thesis option.

Part-Time Program Fee Student - Graduate Studies
A part-time graduate student paying program fees (see Section 1.3, page 19) is a student who has been approved by the department and the Faculty of Graduate Studies as working part-time on their graduate degree. A part-time graduate student is taking less than nine credit hours per term.

Part-Time Per Course Fee Student
A student who is taking less than nine credit hours (three half-credit classes) in a term is considered a part-time student.

Per Class Fee
The fees charged to students in a Per-Class Fee Degree. Students pay fees according to the number of classes taken in any given term. Please refer to Faculty of Graduate Studies Regulations 1.3, page 19 and 4.1, page 22.

Practicum
See Internship.

Prerequisite
A requirement that must be fulfilled prior to registering in a specific class.

Program Fees
The tuition fees charged to students in a program-fee degree. The program fee is based on total tuition for a specified number of years, varying according to academic program. Students who have not completed their program after the specified number of years are required to pay a

continuing fee. Please refer to Faculty of Graduate Studies Regulation 1.3, page 19 and 4.1, page 22.

Qualifying Students (Master's only)

A full-time or part-time student with a Bachelor's degree or its equivalent in whom a department has expressed an interest as a potential graduate student, but who is without a sufficient GPA or academic background in a particular discipline to be enrolled directly in a Master's program. See Faculty Regulation 4.3.6. page 23

Required Withdrawal

A student's required withdrawal from a graduate program due to unsatisfactory academic performance or failure to meet admission or program conditions. See Faculty Regulation 4.2.4, page 22.

Residency

The period of time that graduate students are expected to be on campus for fulfilment of their formal program requirements. In some programs, part of the residency period may, with permission, include some time off campus (e.g. for fieldwork or research).

Special Student - Graduate Studies

A student who is not registered in a graduate program but is taking graduate classes. Special students must satisfy normal admission requirements.See Regulation 4.3.7., page 23

Thesis Only Fees

See Continuing Fees.

Thesis Program

A Master's or Doctoral program of study involving a major research component in the form of a written thesis. Some programs offer a non-thesis option.

Transcript

A transcript is a complete history of a student's academic record at Dalhousie. Partial transcripts, e.g., a portion of a student's record pertaining to registration in a particular degree or faculty only, are not issued.

Transfer Student

A transfer student is one who is awarded credit towards a Dalhousie degree for academic work completed at a previous university or equivalent institution of higher learning.

Visiting Student

A person permitted to take classes at Dalhousie for transfer of credit to another university.

Work Term

Career related work experience required in Co-operative Education programs. Work terms are usually of 13-16 weeks duration.

Class Codes

Numbers

1000-level classes are introductory
2000-4000 level classes are advanced
5000-9000 level are Graduate level (with some exceptions)

Credit Hours - examples only

0.06 credit hours = 1 full credit
0.03 credit hours = ½ credit
0.00 credit hours = no credit

Subject Codes

Four letter codes are used to describe the department offering a particular class as follows:
AGRI - Agriculture
ANAT - Anatomy & Neurobiology
ARBC - Arabic
ARCH - Architecture
ARTC - Applied Health Services Research
ASSC - Arts and Social Sciences Interdisciplinary
BIOC - Biochemistry and Molecular Biology
BIOE - Biological Engineering
BIOL - Biology
BIOT - Bioethics
BMNG - Biomedical Engineering
BUSI - Business Administration
CANA - Canadian Studies
CH&E - Community Health & Epidemiology
CHEE - Chemical Engineering
CHEM - Chemistry
CHIN - Chinese
CIVL - Civil Engineering
CLAS - Classics
COMM - Commerce
CPST - Complimentary Studies
CRWR - Creative Writing
CSCI - Computer Science
CTMP - Contemporary Studies
DCYT - Diagnostic Cytology
DEHY - Dental Hygiene
DENQ - Dentistry Qualifying
DENT - Dentistry
DISM - Disability Management
DMUT - Diagnostic Medical Ultrasound Technology
ECED - Electrical and Computer Engineering
ECMM - Electronic Commerce
ECON - Economics
EDUC - Education
EMSP - Early Modern Studies Program
ENGI - Engineering
ENGL - English
ENGM - Engineering Math
ENVE - Environmental Engineering
ENVI - Environmental Studies
ENVS - Environmental Science
ERTH - Earth Sciences
EURO - European Studies
FOSC - Food Science & Technology
FREN - French
GEOG - Geography
GERM - German
GWST - Gender and Women's Studies
HAHP - Health and Human Performance
HEED - Health Education
HESA - Health Services Administration
HINF - Health Informatics
HIST - History
HLTH - Health Professions
HPRO - Health Promotion
HSAI - Health Services Administration (International)
HSCE - Health Sciences
HSTC - History of Science and Technology
HUCD - Human Communication Disorders
IDIS - Interdisciplinary Studies
IENG - Industrial Engineering
INFO - Information Management
INFX - Informatics
INTD - International Development Studies
INTE - Interdisciplinary Studies (Graduate)
INWK - Engineering Internetworking
ITAL - Italian
JOUR - Journalism
KINE - Kinesiology
KING - King's Foundation Year Program
LAWS - Law
LEIS - Leisure Studies
MARA - Marine Affairs
MARI - Marine Biology
MATL - Materials Engineering
MATH - Mathematics
MDLT - Medical Lab Technology

MECH - Mechanical Engineering
MEDI - Medicine
MEDS - Medical Science
MGMT - Management
MICI - Microbiology & Immunology
MINE - Mining Engineering
MUSC - Music
NESC - Neuroscience
NUMT - Nuclear Medicine Technology
NURS - Nursing
OCCU - Occupational Therapy
OCEA - Oceanography
ORAL - Oral & Maxillofacial Surgery
PATH - Pathology
PETR - Petroleum Engineering
PGMD - Post-Graduate Medicine
PGPH - Post-Graduate Pharmacy
PHAC - Pharmacology
PHAR - Pharmacy
PHIL - Philosophy
PHYC - Physics and Atmospheric Science
PHYL - Physiology
PHYT - Physiotherapy
PLAN - Planning
POLI - Political Science
PROS - Prosthodontics
PSYO - Psychology
PUAD - Public Administration
RADT - Radiological Technology
REGN - Registration Course - Graduate
RELS - Religious Studies
RSPT - Respiratory Therapy
RUSN - Russian Studies
SCIE - Science
SLWK - Social Work
SOSA - Sociology and Social Anthropology
SPAN - Spanish
STAT - Statistics
THEA - Theatre
TYPR - Transition Year Program
VISC - Clinical Vision Science

Academic Regulations

Registration

Registration material for September 2008 will be available on the Web at www.registrar.dal.ca in late June. Students are strongly encouraged to register early.

A student is registered only after financial arrangements have been made at the Student Accounts Office.

The final step is obtaining an ID or validating an existing ID from the DALCARD office. ID cards are mandatory and must be presented to write an officially scheduled examination. In addition, some services such as the issuance of bursary or scholarship cheques, library privileges and Dalplex require the presentation of a valid Dalhousie ID.

Class Withdrawal

Non-attendance does not, in itself, constitute withdrawal.
Withdrawals are not effective until written notification is received at the Office of the Registrar.

Dalhousie University

Dalhousie University, located in the heart of Halifax, Nova Scotia, an international port city known for its scenic beauty, vibrant culture and rich heritage, is one of Canada's leading universities. We are widely recognized for outstanding academic quality and the opportunities presented by our broad range of educational and research activities.

Since 1818, Dalhousie has a long tradition of excellence and achievement. Dalhousie offers more than 3,600 diverse courses in over 180 undergraduate, graduate and professional degrees. We also encourage student learning through exchange programs, fieldwork, community service and co-operative education. Our collaborative learning environment encourages our nearly 16,000 students to interact with one another and with faculty experts to share ideas and offer new perspectives.

Our collaborative spirit extends off campus, as well. We conduct research in partnership with teaching hospitals, professional organizations, businesses, nonprofit agencies, and other universities. As Atlantic Canada's leading research university, we attract more than $93 million in research grants and awards annually, allowing us to conduct a wide variety of research projects.

In 1997, the Technical University of Nova Scotia amalgamated with Dalhousie University, creating a dynamic new centre of advanced technical education and research in Nova Scotia, in the areas of architecture, computer science and engineering.

The University of King's College, situated adjacent to the Dalhousie campus, is an affiliated institution, and its students in Arts and Science receive Dalhousie degrees in the name of both institutions. Degrees in agriculture, awarded to students of the Nova Scotia Agricultural College, are awarded by Dalhousie in co-operation with the College.

Dalhousie University is a member of the Association of Universities and Colleges of Canada, the Atlantic Association of Universities, and the Association of Commonwealth Universities.

Executive Officers

President and Vice-Chancellor
Tom Traves, BA, MA, PhD

Vice-Presidents

Academic and Provost
Alan Shaver, BSc (Hon), PhD

Finance and Administration
Ken Burt, BA, MBA

External
Floyd W. Dykeman, BA, MPL

Student Services
Bonnie Neuman, BA, MA, EdD

Research
W. Carl Breckenridge, BSc (Hon), MSc, PhD

Associate Vice-President, Academic
Larry Maloney, B.P.E., BEd, MA, PhD

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Jim Vibert, BA

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Katherine Sheehan, BA, CHRP

Deans of Faculties

Architecture and Planning
J. Grant Wanzel, BArch, MArch (Toronto), MRAIC

Arts and Social Sciences
Marian Binkley, BA, MA, PhD (Toronto)

Computer Science
Michael Shepherd, MSc, PhD (Western)

Dentistry
David S. Precious, CM, DDS, MSc, FRCDC, FICD, FADI, FACD, FRCS (England)

Engineering
L. Joshua Leon, BSc, MSc, PhD (Dal), PEng

Graduate Studies
Carolyn Watters, BSc, MSc, MLS (Western), PhD (TUNS)

Health Professions
William G. Webster, BSc (Hon), MA, PhD

Law
Phillip Saunders, BA (Hon), MA, LLB (Dal)

Management
David Wheeler, BSc (Hons) (Surrey), PhD (Surrey)

Medicine
Harold W. Cook, BSc, MSc, PhD (Dal)

Science
Keith Taylor, BSc (St.FX), PhD (Alberta)

College of Continuing Education
Andrew Cochrane, BPER, MBA

College of Arts and Science, Provost
Marian Binkley, BA, MA, PhD (Toronto)

Administrative Officers

University Legal Counsel
Karen Crombie, BA (Hon), JD

University Librarian
William Maes, AB, MA, MLS

University Registrar
Asa Kachan, BA, MLIS

Director of Government Relations
Gillian Wood, BA, MA (Economics)

Coordinator, Special Projects, President's Office
Kim Thomson, BSA, MBA

Executive Directors

Computing and Information Services
John Sherwood, BSc, EP

Centre for Learning and Teaching
Lynn Taylor, BSc and BEd (Memorial), MA (Dal), PhD (Ottawa)

Office of Institutional Analysis and Research
Elizabeth Lane, BA, MA

Directors

Alumni and Donor Relations
Ian Murray, BA

Arts Centre
Heather McGean, BA

Athletics and Recreational Services and Dalplex
Al Scott, BPE (Calgary), MSc (Oregon)

Counselling and Psychological Services
Victor Day, PhD

Environmental Health and Safety
William Louch, PhD

Facilities Management
Jeffrey W. Lamb, BEng, MEng (Royal Military College)

Health Services
Kim Plaxton, MD (UofT), CCFP (Dal) FCFP

Housing, Conference and Ancillary Services
Heather Sutherland, BSc, MEd

Student Resources
Sharon Johnson-Legere, BBA, MBA, CA, CHRP

Board of Governors
Under the University's statutes, the Board of Governors is responsible for the operation of the University. The Board consists of representatives named by the Government of Nova Scotia, the alumni, the Student Union and certain other bodies. Internal regulation of the University is the primary concern of the Senate, subject to approval of the Board of Governors.

The President and Vice-Chancellor is the Chief Executive Officer of the University, responsible to the Board of Governors and Senate for supervision of the University's administrative and academic work.

Chancellor
Dr. Richard B. Goldbloom, O.C.

Chancellor Emeritus
Dr. Rueben Cohen
Sir Graham Day
Dr. Ruth Goldbloom

Executive
Hon. Lorne Clarke
Senator James S. Cowan, Chair
Mr. Mike Tipping
Dr. Lloyd A. Fraser
Ms. Cathy MacNutt, Vice Chair
Mr. Don Mills, Honourary Secretary
Mr. Robert Chisholm
Mr. William Black
Dr. Jim Spatz
Mr. Bruce Towler, Honourary Treasurer
Dr. Tom Traves, President

Members
Mr. Jay Abbass
Mr. Jamie Baillie
Ms. Elizabeth Beale
Mr. Level Chan
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Dr. Richard Goldbloom
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Ms. Nancy MacCready-Williams
Prof. Sunny Marche
Mr. Robert Radchuck
Mr. David Russell
Mr. Chris Smith
Mr. Lawrence Stordy
Mr. Jim Wilson
Ms. Shannon Zimmerman

University Secretary
Susan Brousseau

Observer for Faculty Association
Dr. Kevin Grundy

Senate
The Senate is the University's senior academic decision-making body. It is responsible for the approval of new programs and academic units and it manages the reviews of Faculties, Centres and Institutes. Senate approves the granting of degrees and diplomas, including the conferral of Honorary Degrees. It is responsible for setting academic regulations which affect the University as a whole, including regulations governing student conduct and discipline, as well as regulations concerning faculty tenure and promotion.

Senate has 73 members - 49 elected Faculty representatives, 16 academic administrators (President, Vice-President Academic, Vice-President Research, University Librarian, and the Deans of each faculty), six students elected by the Dalhousie Student Union, and a representative from the university of Kings College and the Nova Scotia Agricultural College.

Senate normally meets on the second Monday of each month from 4:00 - 6:00 p.m. In addition, if there are sufficient items of business, Senate will meet on the fourth Monday of the month, from 4:00 - 6:00 p.m.

Chair of Senate
Lloyd A. Fraser, EdD

Vice Chair of Senate
Peter M. Butler, PhD

Secretary of Senate
Bruce Dunphy, MD, MEd, FRSC (c)

University Regulations

General

1. The Senate is charged with the internal regulations of the University, including all matters relating to academic affairs and discipline, subject to the approval of the Board of Governors. Within the general policies approved by Senate, academic requirements are administered by the Faculty concerned.
2. All students must agree to obey all the regulations of the University already made or to be made; in addition to the above University regulations, students must also comply with the regulations of the Faculty in which they are registered, and pay the required fees and deposits before entering any class or taking any examinations. Additionally, students are advised that this Calendar is not an all-inclusive set of rules and regulations but represents only a portion of the rules and regulations that will govern the student's relationship with the University. Other rules and regulations are contained in additional publications that are available to the student from the Registrar's Office and/or the relevant Faculty, Department or School.
3. For the purpose of admission to the University, the place of residence of a student is the place of domicile. This is normally presumed to be the place (country, province, etc.) where the parents or guardian's home is located. That place remains unchanged unless the Registrar is satisfied that a place of residence is established elsewhere. No person under sixteen years of age is admitted to any class except on the specific recommendation of the admissions committee of the relevant Faculty or School, which shall take into account all aspects of the applicant's preparedness for the class or program involved, and which may attach such conditions to the applicant's admission as the committee judges appropriate.
4. All students must report their local address while attending the University to the Office of the Registrar, on registration or as soon as possible thereafter. Subsequent changes must be reported promptly. This may be done online at www.dal.ca/online.
5. Email is an authorized means of communication for academic and administrative purposes within Dalhousie. The University will assign all students an official email address. This address will remain in effect while the student remains a student and for one academic term following a student's last registration. This is the only email address that will be used for communication with students regarding all academic and administrative matters. Any redirection of email will be at the student's own risk. Each student is expected to check her or his official email address frequently in order to stay current with Dalhousie communications.
6. Students who change their name while attending Dalhousie must provide proof of name change to the Registrar's Office.
7. Students are bound by the regulations of the home faculty regardless of the faculty in which the student takes classes.
8. In the interests of public health in the University, students are encouraged to have a tuberculin test. This is compulsory for Dentistry, Dental Hygiene, Physiotherapy and Nursing students. Facilities for testing are arranged by the University Health Services.
9. Except for university purposes, transcripts, official, or unofficial, will be issued only on the request of the student, and where appropriate, on payment of the required fee. A student may receive only an unofficial transcript. Official transcripts will be sent on a student's request to other universities, or to business organizations, etc. A transcript is a complete history of a student's academic record at Dalhousie. Partial transcripts, e.g., a portion of a student's record pertaining to registration in a particular degree, faculty or level of study only, are not issued.
10. Students withdrawing voluntarily from the University should consult the individual faculty regulations and the Fees section of this Calendar.
11. When the work of a student becomes unsatisfactory, or a student's attendance is irregular without sufficient reason, the faculty concerned may require withdrawal from one or more classes, or withdrawal from the Faculty. If a student is required to withdraw from a Faculty such a student may apply to another Faculty. However, in assessing the application, previous performance will be taken into consideration.
12. Any graduating student who is unable to appear at the convocation is expected to notify the Registrar in writing prior to May 1, for Spring convocations (or October 1 for Fall convocations), giving the address to which the degree/ diploma is to be mailed. Students whose accounts are delinquent on April 15 will not receive their degree/ diploma parchment nor their transcripts. For October graduation the date is September 1.
13. Students should be aware that certain classes at the University involve required laboratory work where radioactive isotopes are present and are used by students. Since there are potential health risks associated with the improper handling of such radioactive isotopes, Dalhousie University requires that, as a condition of taking a class where radioactive isotopes are to be used, students read and agree to comply with the instructions for the safe handling of such radioactive isotopes. In the event that students do not comply with the instructions for the safe handling of radioactive isotopes, students will receive no credit for the required laboratory work unless other acceptable alternatives are arranged with the instructor. In many cases, alternate arrangements are not possible and students should consider enrolling in a different class.

Rescission of Acceptance into a Program

Dalhousie University reserves the right to rescind any acceptance of an applicant into a program or to rescind an offer of admission of an applicant into a program. Such rescission shall be in writing and may be made by the President or the Vice-President (Academic) and Provost, in consultation with the appropriate Dean, at any time prior to the applicant's registration being confirmed by the Registrar. Any such rescission shall be reported to the Senate in camera.

Official Examination Regulations

1. Candidates will not be admitted to the Examination Room more than thirty minutes after the beginning of the examination. Candidates will not be permitted to leave the examination within the first thirty minutes.
2. Candidates are required to present their valid Dalhousie ID card at all examinations scheduled during the official examination periods and sign the signature list when used.
3. No articles such as books, papers, etc. may be taken into the examination room unless provision has been made by the examiner for reference books and materials to be allowed to the students. All books, papers, etc. not specified on the printed paper as well as electronic computing, data storage and communication devices must be deposited with the invigilator. Calculators may be used at the discretion of the instructor.
4. Candidates may not leave their seats during an examination except with the consent of the invigilator.
5. Answers to questions must be written on the right hand pages and properly numbered. The left hand pages may be used for rough work, but no sheets may be detached.
6. Each question should be started on a separate page.
7. If more than one book is used, the total number should be marked in the space provided above. The other books should be properly marked and placed inside the first book. All books supplied must be returned to the invigilator.
8. Candidates found communicating with one another in any way or under any pretext whatever, or having unauthorized books, papers, electronic computing, data storage, or communication devices in their possession, even if their use be not proved, shall be subject to expulsion.

9. After the first thirty minutes have elapsed, students may hand in their examination book(s) to an invigilator and quietly leave the examination room. Candidates may not leave the examination room during the last fifteen minutes of the examination.

Policy in the Event that a Formal Examination Cannot be Completed at the Regularly Scheduled Time

Formal examinations, up to three hours in length, are scheduled by the Registrar each December and April during formal examination periods, as laid out in the Calendar. If, in the unusual event that one of these examinations must be postponed or abandoned at short notice, the following policies will apply.

1. If more than fifty percent of the time allocated for the examination has elapsed, students' work up to the premature end of the examination, but prorated for the actual time written, will lead to the mark to be obtained from the formal examination.
2. If less than fifty percent of the time allocated for any examination has elapsed, the examination will be rewritten as soon as possible, normally on a day when examinations are not scheduled. Students will be informed by the Registrar of the time and place of the rewrite on the Website of the Registrar (www.registrar.dal.ca).
3. In all cases in which a formal examination cannot be written at its scheduled time and special arrangements must be made, it is essential that faculty ensure that all students in the class are treated fairly and equitably and according to the evaluative criteria in the class description given to students at the beginning of the term.
   If an examination is terminated as under point #1, any student who feels disadvantaged by not having been able to write an examination for the length specified in the class description, may appeal through the appropriate departmental or school appeal mechanism for an examination of the specified length. Appeals will be in writing and in a timely fashion. If the appeal is granted, arrangements for such a makeup examination will be made between the student and the class professor.
4. If a formal examination cannot be written at its scheduled time, it is the responsibility of students to check the Registrar's Website for when the examination will be rewritten. Announcements will be made as soon as possible after the original time, normally within 24 hours, and rewrites will normally take place within the regular examination period.

Policy for the Scheduling of Classes/ Examinations

Normally, the University schedules and conducts classes on weekdays, i.e., Monday to Friday, and sometimes Saturday, and examinations on weekdays and Saturdays, but not Sundays or statutory Holidays. However the University reserves the right, in exceptional circumstances and with the approval of Senate, to schedule classes or examinations on Sundays or statutory holidays, as the case may be.

Requests for an Alternative Final Examination Time

A student requesting an alternative time for a final examination will be granted that request only in exceptional circumstances. Such circumstances include illness (with medical certificate) or other mitigating circumstances outside the control of the student. Elective arrangements (such as travel plans) are not considered acceptable grounds for granting an alternative examination time. In cases where it is necessary to make changes to examination arrangements late in the term, or Senate has approved exceptional examination arrangements, a special effort will be made to accommodate difficulties the changes may cause for individual students.

The decision whether to grant a student's request for an alternative examination time lies with the instructor of the course concerned as does the responsibility for making the alternative arrangements.

This policy may also be applied at the discretion of the instructor to tests and examinations other than final examinations.

Religious Holidays/Examination Schedule

The University acknowledges that, due to the pluralistic nature of the University community, some students may on religious grounds require alternative times to write examinations and tests. Accordingly, a student who requires an alternative examination or test time on religious grounds should consult with the instructor regarding alternative arrangements. Such a request should be made in writing within one week of the announcement of the test or examination date.

Retention of Student Work

Faculties of Architecture and Planning and Engineering

All work executed by students as part of their academic programs in the Faculties of Architecture and Planning and Engineering automatically becomes the property of the University and may be retained for exhibition or other purposes at any time and for an indefinite period.

Faculty of Computer Science

The Faculty of Computer Science has the right to retain the original or a copy of any work handed in by students. This will only be used for evaluation or for administrative purposes. The permission of the originator of the work is required if it is to be used in any other way.

Freedom of Information and Protection of Privacy

The Freedom of Information and Protection of Privacy Act (FOIPOP) provides for the protection of an individual's right to privacy but also requires that certain records be disclosed upon request unless they are exempted from disclosure. The Act requires that the University not disclose personal information if that information would constitute an unreasonable invasion of personal privacy. Applicants to Dalhousie are advised that information they provide along with other information placed in a student file will be used in conjunction with university practices for internal university use and will not be disclosed to third parties except in compliance with the FOIPOP Act or as otherwise required by law.

Release of Information About Students

The following information is available, without application through the Freedom of Information and Protection of Privacy Act:

I. Disclosure to students of their own records

1. Students have the right to inspect their academic record. An employee of the Registrar's Office will be present during such an inspection.
2. Students will, on submission of a signed request and payment of a fee where appropriate, have the right to receive transcripts of their own academic record. These transcripts will be marked "ISSUED TO STUDENT". The University will not release copies of transcripts if students owe monies to the University.
3. If transcripts are issued for a student while a senate discipline case is pending and the committee subsequently makes a decision that affects the student's transcript, revised transcripts will be sent to recipients if transcripts are issued while the case was pending.

II. Disclosure to Faculty, Administrative Officers, and Committees of the University

Information on students may be disclosed without the consent of the student to University officials or committees deemed to have a legitimate educational interest.

III. Disclosure to Third Parties

1. The following information is considered public information and may be released without restriction:
   - Name
   - Period of Registration
   - Certificates, Diplomas, Degrees awarded
   - Field of Study (as relates to degree awarded)
   - Hometown and Awards/Distinctions*

   *As indicated in the convocation program.

2. Information will be released without student consent to persons in compliance with a judicial order or subpoena or as required by federal or provincial legislation.
3. Necessary information may be released without student consent in an emergency, if the knowledge of that information is required to protect the health or safety of the student or other persons. Such requests should be directed to the Registrar.
4. In compliance with Statistics Canada requirements, a student's national personal identification number assigned by the university or college first attended will routinely appear on a student's transcript of record.
5. The Federal Statistics Act provides the legal authority for Statistics Canada to obtain access to personal information held by educational institutions. The information may be used only for statistical purposes, and the confidentiality provisions of the Statistics Act prevent the information from being released in any way that would identify a student.

   Students who do not wish to have their information used are able to ask Statistics Canada to remove their identifying information from the national database.

   Students should also be aware that the Maritime Provinces Higher Education Commission (MPHEC) collects data on behalf of Statistics Canada, and that it uses the data for similar purposes. Statistics Canada will notify the MPHEC of any student choosing to have their personal information removed from the national database, and their information will subsequently be removed from the MPHEC's database.

   Further information on the use of this information can be obtained from the Statistics Canada Website: http://www.statcan.ca or by writing to the Postsecondary Section, Centre for Education Statistics, 17th Floor, R.H. Coats Building, Tunney's Pasture, Ottawa, K1A 0T6.
6. Other than in the above situations, information on students will be released to third parties only at the written request of the student, or where the student has signed an agreement with a third party, one of the conditions of which is access to her/his record (e.g., in financial aid). This restriction applies to requests from parents, spouses, credit bureaus and police.

Policy on Accessibility for Students with Disabilities

1. Dalhousie University is committed to the goal of providing equal opportunity for qualified students with disabilities. To demonstrate full respect for the academic capacities and potential of students with disabilities, the University seeks to remove attitudinal and environmental restrictions which may hamper or prevent academically-qualified students with disabilities from participating fully in University life. The University understands that persons with disabilities may have different ways of doing things, recognizing that performance is not inferior merely because it is different.
2. The University recognizes, subject to its financial and other resource constraints, that qualified students with disabilities have a right to:
   2.1 full access to all educational programs;
   2.2 full access to the educational process and learning environment (including but not limited to classes, laboratories, workshops);
   2.3 full access to the University campus; and
   2.4 full access to University facilities and services.
3. The University recognizes that qualified students with disabilities have a right to assistance that is individualized with respect to scope and pace, consistent with the student's needs, legitimate academic demands, and the University's capacity to respond.
4. To ensure that qualified students with disabilities may pursue quality post-secondary education, the University shall:
   4.1 be proactive in fostering, creating and maintaining a barrier-free environment, including:
      a) the provision of support services, within reasonable financial and resource limitations; and
      b) promoting an attitude of respect for persons with disabilities, and
      c) promoting sensitivity to the needs and abilities of persons with disabilities;
   4.2 inform the University community about the services available to qualified students with disabilities and seek to ensure that such services are delivered in ways that promote equity;
   4.3 where warranted and without compromising the academic standards, and through the relevant academic authority, modify:
      a) workload;
      b) examination procedures;
      c) other class requirements; and
      d) scholarship and other financial assistance requirements; and
   4.4 take all reasonable steps to consult students with disabilities as fully as possible about decisions relating to matters affecting them.
5. In accordance with provisions in the Human Rights Act, the University may also define essential requirements for professional performance for students in programs, where these are appropriate, and this policy is not intended to replace or supersede these requirements.
6. Students with disabilities requiring assistance from the University shall:
   6.1 initiate contact with the Advisor to Students with Disabilities and make the nature of their disability and/or their needs known; and
   6.2 be expected to undertake a reasonable measure of self-advocacy to ensure they are provided with an equal opportunity by Dalhousie University.
7. The responsibility to implement these policies throughout the University rests on all members of the University community, including all faculty, administration, staff, students and the Advisor to Students with Disabilities.

Procedures Regarding Students with Learning Disabilities

Dalhousie University is committed to providing equal educational opportunities and full participation for students with learning disabilities. These procedures regarding students with learning disabilities derive from the University's Policy on Accessibility for Students with Disabilities as stated above. These students are intellectually capable and possess potential which may not be fully realized without a recognition of their special needs. We are both morally and legally required to supply such support consistent with the Policy on Accessibility for Students with Disabilities.

I. Admission

Students with diagnosed learning disabilities who meet the current admission requirements for Dalhousie University may follow the current admission procedures. All new Dalhousie students will receive in the offer of admission a statement indicating that, if they have a learning disability or any other disability for which they will require accommodations or special assistance, they should contact the Advisor to Students with Disabilities, in order to ascertain the degree to which their needs can be met.

Students with diagnosed learning disabilities who do not meet the current admission requirements or who otherwise wish to have their learning disability considered may apply for special consideration as may all other students who have extenuating circumstances. These requests will be made to the appropriate admissions committee, acting in consultation with the Advisor to Students with Disabilities and the other knowledgeable professionals.

The following documentation must be submitted by students who wish to apply for special consideration:
1. Letter(s) of recommendation from the individual(s) most familiar with the applicant's academic performance and/or potential for success at university;
2. A written, oral or electronic statement from the student. In this brief personal statement, students should describe their learning disability, how this affected their grades and the type of assistance they would require while at Dalhousie University;

3. A current (within three years) psychological assessment based on standard diagnostic instruments administered by a registered psychologist documenting the presence of learning disabilities. If a current report is not possible, Dalhousie University may accept an earlier report along with a current opinion (i.e., within the past year) expressed in a letter by a registered psychologist (or individual supervised by a registered psychologist) that the student has a learning disability. This letter should specify the nature, extent and rationale for program modifications or accommodations that were deemed appropriate in the student's last two years of schooling.

II. Academic Accommodation for Students with Learning Disabilities

Students requesting academic accommodation will arrange a personal interview with the Advisor to Students with Disabilities. Schools and Faculties will provide relevant Faculty committees and individual Faculty members with fairly specific instruction as to the circumstances in which certain types of accommodation are normally to be made (e.g., the language requirement of the Faculty of Arts and Social Sciences). The Advisor to Students with Disabilities will assist faculty and students in developing reasonable accommodations.

A. Documentation Required

The student will provide the Advisor with a current (within three years) psychological report documenting the presence of a learning disability as outlined in Section A. above.

B. Procedures Regarding Academic Accommodation

Students are expected to identify themselves as having a learning disability and inform the Advisor to Students with Disabilities as early as possible and preferably before the beginning of the term. They should make this initial contact during office hours and be prepared to discuss strengths, weaknesses and the types of accommodation that may be necessary.

The Dalhousie University Policy on Accessibility for Students with Disabilities will guide the Faculties and the relevant committees in their deliberations. That policy specifies three factors that must be taken into account when considering requests for accommodations from students with disabilities: the needs of the students; preservation of the academic integrity of the programs; and the ability of the University to provide resources.

C. Types of Academic Accommodation

The types of academic accommodation provided for students with learning disabilities may vary depending on the nature of the learning disability and the class content. For example, a student may benefit from an oral exam in one subject area, but not in another. It is not unusual for there to be an initial trial-and-error period of finding the best way to evaluate a student's ability to demonstrate mastery of class material.

Accommodations for students with learning disabilities typically can include but are not necessarily limited to the following:

1. Extend the time permitted for a student with a learning disability to earn a degree;
2. Modify program requirements (e.g., class substitutions);
3. Permit examinations to be proctored, read orally, dictated or typed;
4. Allow extra time for completion of examinations and extend the time for the examination period;
5. Change the test format (e.g., multiple choice to essay);
6. Provide alternative formats for class materials;
7. Permit basic four-function calculators and standard desk dictionaries during examinations;
8. Use alternative methods for students to demonstrate academic achievement (e.g., a narrative tape instead of a journal);
9. Permit review of final drafts of term papers with a proofreader and make changes without altering content; and
10. Use computer software programs to assist in test-taking.

D. Appeals

Admission and program appeals by students with learning disabilities will follow the usual procedures of the relevant Faculty at Dalhousie University.

E. Release of Information About Students

A student will be told before disclosing any information on learning disabilities that such information will be governed by the University Regulations on the Release of Information as indicated in this calendar.

III. Support Services

Dalhousie University endeavours to provide a broad range of support services to all of its students. Students wishing to obtain assistance from the University shall be expected to undertake a reasonable measure of self-advocacy to ensure that they are provided with the support services necessary. Such support services may include personal counselling, academic counselling, academic advising, and academic skill training.

NOTE: Accommodation of a student's needs due to disability will be facilitated if the student self-discloses and makes prior arrangements. Accommodation may be hindered if advance notification and/or prior arrangements have not been made

Policy on Submission of Student Papers

Any instructor may require student papers to be submitted in both written and electronic (computer-readable) form, e.g., a text file on floppy disk or as an email attachment, as defined by the instructor. The instructor may submit the material to a third-party computer- based assessment system(s) for the purpose of assessing the originality of the paper. The results of such assessment may be used as evidence in any disciplinary action taken by the Senate.

Intellectual Honesty

A university should be a model of intellectual honesty. Failure to meet the University's standards in this regard can result in an academic offence. The length of time a student has attended university, the presence of a dishonest intent and other circumstances may all be relevant to the seriousness with which the matter is viewed.

Violations of intellectual honesty are offensive to the entire academic community, not just to the individual faculty member and students in whose class an offence occurs.

Instructors are responsible for setting examinations and assignments as part of the learning process and for evaluating those examinations and assignments, including ensuring that any rules stated for the procedures used in an examination or assignment are followed. Any violation of such stated rules which could result in a student gaining advantage may be considered to be an academic offence.

Examples of Academic Offences

There are many possible forms of academic dishonesty. Since it is not possible to list all instances of academic dishonesty, the following list of examples should be considered only as a guide. The omission of a dishonest action from this list does not prevent the University from prosecuting an alleged instance of that action.

A. Plagiarism

Dalhousie University defines plagiarism as the submission or presentation of the work of another as if it were one's own.

Plagiarism is considered a serious academic offence which may lead to the assignment of a failing grade, suspension or expulsion from the University. If a penalty results in a student no longer meeting the requirements of a degree that has been awarded, the University may rescind that degree.

Some examples of plagiarism are:

- failure to attribute authorship when using a broad spectrum of sources such as written or oral work, computer codes/programs, artistic or architectural works, scientific projects, performances, web page designs, graphical representations, diagrams, videos, and images;
- downloading all or part of the work of another from the Internet and submitting as one's own; and
- the use of a paper prepared by any person other than the individual claiming to be the author.

The University attaches great importance to the contribution of original thought to learning and scholarship. It attaches equal importance to the appropriate acknowledgement of sources from which facts and opinions have been obtained.

The proper use of footnotes and other methods of acknowledgement vary from one field of study to another. Failure to cite sources as required in the particular field of study in the preparation of essays, term papers and dissertations or theses may, in some cases, be considered to be plagiarism.

Students who are in any doubt about how to acknowledge sources should discuss the matter in advance with the faculty members for whom they are preparing assignments. In many academic departments, written statements on matters of this kind are made available as a matter of routine or can be obtained on request. Students may also take advantage of resources available through the Writing Centre at writingcentre.dal.ca or the Dalhousie Libraries at infolit.library.dal.ca/tutorials/Plagiarism/.

B. Irregularities in the Presentation of Data from Experiments, Field Studies, etc.

Academic research is based on the presentation of accurate information and data that are obtained honestly. The falsification of data in reports, theses, dissertations and other presentations is a serious academic offence, equivalent in degree to plagiarism, for which the penalties may include the assignment of a failing grade, suspension or expulsion from the University or the withdrawal of a degree previously awarded.

C. Other Irregularities

A member of the University who attempts, or who assists any other person in an attempt, to fulfill, by irregular procedures, any requirements for a class, commits an academic offence and is subject to a penalty.

In the absence of specific approval from the instructor of a class, all students should assume that all assignments are to be completed independently, without any form of collaboration.

Students should take reasonable precautions to prevent other students from having access, without permission, to their tests, assignments, essays or term papers.

The following are some examples of irregular procedures. The list should be used only as a guide since it is not possible to cover all situations that may be considered by the Senate Discipline Committee to be irregular.

- writing an examination or test for someone else;
- attempting to obtain or accepting assistance from any other person during an examination or test;
- during the time one is writing an examination or test, using or having in one's possession, material that is not specifically approved by the instructor;
- without authorization, obtaining a copy of an examination or test, topic for an essay or paper, or other work;
- without authorization from the faculty member in charge of that class, submitting any work for academic credit when one is not the sole author or creator;
- without authorization submitting any work that has been previously accepted for academic credit in any other class in any degree, diploma or certificate program, or has been completed as part of employment within the University, for example, as research activity. A repeated class is considered to be a separate class.

D. Aiding in the Commission of an Academic Offence

No student may encourage or aid another student in the commission of an academic offence, for example,

- by lending another student an assignment knowing that he or she may copy it for submission;
- by allowing another student to copy answers during an examination.

E. Misrepresentation

Any person who provides false or misleading information during an investigation of a suspected academic offence is guilty of an offence.

Discipline

1. Members of the University, both students and staff, are expected to comply with the general laws of the community, within the University as well as outside it.
2. Alleged breaches of discipline relating to student activities under the supervision of the Dalhousie Student Union are dealt with by the Student Union. Alleged breaches of discipline relating to life in the residences are dealt with by the residence discipline policy unless the President determines that some non-residence University interests are involved. Senate is charged with the authority to deal with cases of alleged academic offenses, see examples above, as well as with certain other offenses that are incompatible with constructive participation in an academic community.
3. On report of a serious breach of the law, or a serious academic offence deemed by the President, or in his or her absence by a Vice-President or the Dean of a Faculty, to affect vital University interests, a student involved may be temporarily suspended and denied admission to classes or to the University by the President, Vice-President or Dean, but any suspension shall be reported to the Senate, together with the reasons for it, without delay.
4. No refund of fees will be made to any student required to lose credit for any class taken, required to withdraw or who is suspended or dismissed from any class or any Faculty of the University.

Academic Dishonesty

I. Preamble

These procedures deal with academic dishonesty and do not deal with violations of the student code of conduct. The purpose of these procedures is to delegate assessment of certain allegations of academic dishonesty to the Faculty level.

II. Academic Integrity Officers

1. Academic Integrity Officers are associated with the Faculties of Dalhousie University.
2. The Academic Integrity Officer shall act between the student and instructor, and may appear at Hearing Panels of the Discipline Committee or the Discipline Appeals Board to present the case against the student.
3. The Academic Integrity Officer is the Dean of the Faculty. The Dean may further delegate this role to one or more members of his/her academic staff except those who are Senate Officers, who are otherwise involved in the student discipline process, or who otherwise are in a potential conflict of interest relative to this role. Annually the name of the delegate(s) shall be communicated in writing to the Secretary of Senate who shall report to Senate.
4. The Academic Integrity Officers shall meet as a group with the Senate Discipline Committee (SDC) at least once a year to discuss relevant policy issues and training requirements with a view to maximizing consistency and predictability in the administration of academic offences across the University. Such meetings will be convened and chaired by the Secretary of Senate.

III. Faculty Procedures

1. When an academic offence is suspected, the instructor shall submit a signed statement outlining the basis for the allegation, together with all relevant supporting evidence, to the Academic Integrity Officer of the Faculty which is responsible for the delivery of the course at issue, or in the case of an allegation in relation to a graduate thesis or other non course graduate materials, to the Academic Integrity Officer of the Faculty of Graduate Studies.
2. Upon receipt of the material from the instructor, the Academic Integrity Officer shall determine whether or not the material supports a prima facie case that the student has committed an academic offence. If not prima facie case is made out, no further steps are taken in relation to the allegation, and the instructor and student will be so advised in writing.
3. If a prima facie case is established, then the Academic Integrity Officer will take the following further steps:

a) Check the academic discipline database maintained by the Senate Office to determine if the student(s) has a record of prior academic offence(s);
b) If the student(s) has a record of prior academic offence(s), forward the allegation to the Senate Discipline Committee;
c) If the allegation appears to be a first offense, inform the student(s) in writing of the nature of the allegation, the instructor's statement, the evidence, the procedures to be followed, the possible penalties, and possible sources of advice and support (will be a standard document);
d) Convene a meeting with the student(s), the student(s)'s advisor, if any, and the instructor within 5 working days upon receipt of the allegation by the student, which time may be extended at the request of the student or instructor in appropriate circumstances.;
e) If the meeting does not take place within the time set out above, refer the allegation to the Senate Discipline Committee.

4. Following the meeting convened in accordance with paragraph 8, the Academic Integrity Officer shall make a preliminary assessment of whether there is sufficient evidence to support a finding that the student has committed an academic offence, and if there is sufficient evidence, make a preliminary assessment of what penalty would be appropriate in the circumstances. In making the latter assessment, the Academic Integrity Officer shall exercise broad discretion in considering possible mitigating circumstances including but not limited to extraordinary personal circumstances and lack of educational experience.
5. If the Academic Integrity Officer's assessment is that there is insufficient evidence to support a finding that the student has committed an academic offence, s/he shall inform the student in writing with a copy to the Instructor within 5 working days of the meeting. This does not preclude an Academic Integrity Officer from proceeding with the allegation at a later date, should new evidence become available.
6. If the Academic Integrity Officer's assessment is that there is sufficient evidence to support a finding that the student has committed an academic offence, AND that the appropriate penalty for the student's conduct is any of the penalties described in section IV page 14, except those listed in subparagraphs 5 to 9 the Academic Integrity Officer shall provide the student with the option of accepting the finding and the proposed penalty, or of proceeding to the Senate Discipline Committee for a full hearing. The option shall be presented to the student within 5 working days of the meeting, and the student shall have 2 working days to respond. In the event that the student elects to accept the finding and proposed penalty, the Academic Integrity Officer shall so advise the Secretary of Senate.
7. Upon being advised of the finding and agreed penalty, the Secretary of Senate shall bring the matter before Senate for ratification at the next sitting of Senate following the procedures set out for ratification of academic appeals, with necessary changes in point of detail. Following Senate's ratification, the Secretary of Senate shall ensure that the offence is recorded on the Senate Discipline database and that the Registrar and any others are notified of the finding and penalty for immediate implementation.
8. If the Academic Integrity Officer's assessment is that there is sufficient evidence to support a finding that the student has committed an academic offence, but that the appropriate penalty for the student's conduct is one of those listed in subparagraphs 5 to 9 of section IV of these Procedures, the Academic Integrity Officer shall, within 5 working days of the meeting, notify the student in writing, with a copy to the instructor, that the matter will be forwarded to the Senate Discipline Committee for a full hearing.

Senate Discipline Committee

I. Composition

The Committee comprises ten representatives of the faculty elected by Senate for staggered three-year terms, one of whom shall be the Chair (chosen annually by the Committee), five representatives of the Dalhousie University student body, and two representatives of the University of King's College student body. A student who is a member of the Judicial Board of the DSU may not at the same time be a member of the Senate Discipline Committee.

The Senate Nominating Committee shall arrange for nominations to fill casual vacancies for the remainder of the second term.

II. Functions

The Senate Discipline Committee shall:

1. consider all complaints or allegations respecting offenses or irregularities of an academic nature, including those relating to admissions procedures and evaluation procedures, and may impose penalties in cases where the Committee finds an offence or irregularity has occurred;
2. have the power to discipline a student who, before or during the course of the disciplinary process involving him or her but prior to adjudication, has:
   a) been compelled to withdraw academically;
   b) chosen to withdraw from the class, program or University prior to being disciplined;
   c) chosen not to register at the University;
3. assume jurisdiction when a complaint or allegation respecting offenses or irregularities of an academic nature are brought to its attention by the Secretary of Senate; complaints or allegations may be made by faculty or other evaluators of academic work done by students; a panel of Discipline Advisors is available to assist and advise evaluators, and guidelines for evaluators are set out in the document entitled Guidelines for Academic Evaluators Regarding Violations of Academic Regulations by students;
4. conduct hearings according to the rules of natural justice and such other procedures as the Committee may decide in advance, with due notice to all interested parties. A panel of three faculty and two students shall hear each complaint, including complaints made under the Code of Student Conduct. The Committee Chair or alternate chosen by and from the Committee shall chair each hearing;
5. evaluate the evidence of innocence or guilt of an accused student. This evaluation shall include the premise that the more senior the student in terms of chronological age, year of university registration, extent of other exposure to university rules and regulations at Dalhousie University or elsewhere, the less credible are assertions of ignorance or innocence and the stronger is the case for a more severe penalty than would be imposed on a less senior student;
6. report its findings, and any penalty imposed to the Secretary of Senate who shall forward a copy of the report to the student; if the alleged offender is not a student, a copy shall also be sent to the Vice-President (Academic and Provost)

III. Appeals

Appeals from decisions of the Senate Discipline Committee may be made to a Senate Discipline Appeal Board, but only on the limited grounds: (a) denial of natural justice; (b) disputed jurisdiction of the Senate Discipline Committee. Decisions of a Senate Discipline Appeal Board are final and binding on all parties. At the time of filing the appeal a student must specifically indicate the facts and allegations that will form the basis of the appeal. An appeal will be limited to matters so alleged.

Where the rules of a faculty, such as Health Professions, expressly provide that suitability, fitness, or aptitude for the practice of the profession is a requirement for advancement or graduation, or both, and a Faculty determines that a student should be suspended or dismissed or otherwise should not advance or graduate because of unsuitability for the relevant profession, an appeal from the Faculty decision may be made to an ad-hoc appeal committee established by the Senate Steering Committee. The Ad-hoc Appeal Committee shall:(1) hear an appeal by a student from the decision of a Faculty regarding suitability, fitness or aptitude for the practice of the relevant profession when: a) the student has exhausted the approved appeal regulations and procedures of the relevant Faculty; and b) the student alleges that there were irregularities or unfairness in the application of the regulations in question. The Ad-hoc Appeal Committee shall not hear appeals: a) by students on a matter involving a requested exemption from the application of Faculty or University regulations or procedures; b) on substantive aspects of a finding of unsuitability.

IV. Penalties

The range of penalties which may be imposed by the Senate Discipline Committee be circumscribed only by the requirement that such penalty or penalties be of an academic nature and, without restricting the generality of the foregoing, may include any one or more of:

1. notation of the fact of discipline on the offender's transcript for a period of one (1) or more years, but not exceed five (5) years;
2. repeat of the assignment that triggered the discipline;
3. a failing grade or mark or assessment in the piece of work triggering the discipline;
4. failure of the class or seminar or program;
5. failure of the academic year;
6. suspension for an academic term or year (to a maximum suspension of three (3) academic years);
7. expulsion from the University;
8. loss of a current or continuing scholarship, or both, or loss of eligibility to receive or to maintain scholarships or prizes or bursaries; and
9. removal from the Dean's List.

PLEASE NOTE: If transcripts are issued for a student while a Senate Discipline case is pending, and the Committee subsequently makes a decision that affects the student's transcript, revised transcripts will be sent to recipients of transcripts issued while the case was pending

University of King's College

The University of King's College Registrar shall notify the Dalhousie Registrar in the event that academic discipline proceedings have been commenced in relation to a Dalhousie student, and shall advise the Dalhousie Registrar of the outcome of such proceedings, including any sanctions imposed against the student. Where the student has been previously sanctioned for academic misconduct, the Dalhousie Registrar will provide the University of King's College Registrar with particulars of the offence and the sanction imposed.

Code of Student Conduct

I. Background

Dalhousie University is a community of faculty, staff and students, involved in teaching, research, learning and other activities. Students are members of the University for the period of their registration in an academic program and are subject to the disciplinary authority of the University during that time.

The University does not stand in loco parentis to its students. In the exercise of its disciplinary authority, the University treats students as adults free to organize their own personal lives, behaviour and associations subject only to the law, and to University regulations that are necessary to protect:

- the integrity and proper functioning of the academic and non-academic programs and activities of the University or its faculties, schools or departments;
- the peaceful and safe enjoyment of University facilities by other members of the University and the public;
- the freedom of members of the University to participate reasonably in the programs of the University and in activities on the University's premises;
- the property of the University or its members.

Other than this, regulation of student behaviour by the University is neither necessary nor appropriate.

Members of the University, including students, are not immune from the criminal and civil law. Provisions for non-academic discipline should not attempt to shelter students from the normal responsibilities of adult citizens nor add unnecessarily to these responsibilities. Thus, conduct that violates the Criminal Code or other statute should ordinarily be dealt with by the police and criminal courts. In cases, however, in which criminal or civil proceedings would not adequately protect the University's interest and responsibilities as defined above, proceedings may be brought under the Code of Student Conduct.

The University may also define standards of professional conduct for students in programs where these are appropriate, and this Code is not intended to replace or supersede such standards.

II. Code Of Conduct

A. Definitions

1. In this Code, the word "premises" includes lands, buildings and grounds of the University, or other places or facilities used for the provision of the University's programs or services or for University-approved events and activities.
2. In this Code, "student" means a person:
   a) engaged in any academic work or placement which leads to the recording and/or issue of a mark, grade or statement of performance by the appropriate authority in the University or another institution; and/or
   b) registered in, enrolled in, or attending any course or class, or otherwise participating as a learner in any activity which entitles the person to the use of a University library, library materials, library resources, computer facility or dataset.
3. In this Code, the words "Dalhousie University" refer to Dalhousie University and include any institutions affiliated with it, where such inclusion has been agreed upon by the University and the affiliated institution, with respect to the premises, facilities, equipment, services, activities, students and other members of the affiliated institution.
4. Unless otherwise stated, a student will only be liable for conduct that she or he knew or ought reasonably to have known would constitute conduct prohibited under this Code.
5. Nothing in this Code shall be construed to prohibit peaceful assemblies and demonstrations, or lawful picketing, or to inhibit freedom of speech.

B. Application

Conduct shall be deemed to be an offence under this Code, when committed by a student of Dalhousie University, provided that such conduct:

1. occurs on the premises of Dalhousie University;
2. occurs elsewhere in the course of activities sponsored by Dalhousie University (or by any of its faculties, schools or departments), or where the conduct is alleged to adversely affect, disrupt or interfere with another person's reasonable participation in Dalhousie University programs or activities; or
3. occurs in the context of a relationship between the student and a third party and involves the student's standing, status or academic record at the University.

However, this Code will not apply to conduct that:

1. is specifically assigned to another disciplinary body within the University; or
2. is subject to action as an alleged failure to meet standards of professional conduct as required by a college, faculty or school; or
3. is subject to action under a residence discipline policy unless some non-residence University interests are deemed to be involved, in which case the President may specifically authorize proceedings under this Code; or
4. is committed by a student in her or his capacity as an employee of the University unless some non-employment University interests are deemed to be involved, in which case the President may specifically authorize proceedings under this Code;
5. is subject to the disciplinary authority of the Dalhousie Student Union.

C. Offences

1. Offences Against Persons

a) No student shall assault another person sexually, or threaten any other person with sexual assault or commit an act of sexual harassment toward another person.
b) No student shall otherwise assault another person, threaten any other person with bodily harm, or cause any other person to fear bodily harm.
c) No student shall create a condition that unnecessarily endangers the health or safety of other persons.

d) No student shall threaten any other person with damage to such person's property, or cause any other person to fear damage to her or his property.
e) No student shall engage in a course of vexatious conduct, harassment or discrimination that is directed at one or more specific persons and that is based on the age, race,colour, religion, creed, sex, sexual orientation, physical disability, mental disability, an irrational fear of contracting an illness or disease, ethnic or national or aboriginal origin, family status, marital status, source of income, political belief or affiliation or activity of that person or of those with whom he or she associates.
f) No student shall engage in unwelcome or persistent conduct that the student knows, or ought to reasonably know, would cause another person to feel demeaned, intimidated or harassed. Examples of such conduct include, but are not limited to:
   i) following another person, or anyone known to that person;
   ii) unwanted communication with another person or anyone known to that person;
   iii) watching the residence or place of work of another person or anyone known to that person;
   iv) threatening another person or any member of the family, friends or colleagues of the other person;
   v) coercing, enticing or inciting a person to commit an act that is humiliating or demeaning to that other person or to others.

2. Disruption

No student shall, by action, threat or otherwise, disrupt, obstruct or adversely affect any activity organized by Dalhousie University or by any of its faculties, schools or departments, or the right of other persons to carry on their legitimate activities, to speak or to associate with others.

3. Offences Involving Property

a) No student shall take without authorization, misuse, destroy, deface or damage the property of Dalhousie University, or property that is not her or his own, or information or intellectual property belonging to Dalhousie University or to any of its members.
b) No student shall possess the property of Dalhousie University, property in the custody of Dalhousie University, or property that is not her or his own, if the student knows that property to have been taken without authorization.
c) No student shall create a condition that unnecessarily endangers or threatens destruction of the property of Dalhousie University or of any of its members.

4. Unauthorized Use of University Facilities, Equipment or Services

a) No student shall use any facility, equipment or service of the University, or enter or remain on any premises, to which he or she does not have legitimate access, or contrary to the expressed instruction of authorized persons.
b) No student shall use any University computing equipment, facility, network or system for any disruptive or unauthorized purpose, or in a manner that violates any law, Dalhousie University regulations, policies and procedures or in any way that is incompatible with the principles in the Guide to Responsible Computing. Examples of inappropriate use of computer equipment, facilities, networks and systems include, but are not limited to:
   i) copying, removing or distributing software and/or data without authorization;
   ii) using another person's account, or misrepresenting themselves as another user;
   iii) disclosing confidential passwords, access codes, etc., assigned to themselves or others;
   iv) interfering with the work of others using computing equipment, facilities, networks, systems or accounts;
   v) displaying, transmitting, distributing or making available information that is discriminatory, obscene, abusive, derogatory, harassing or otherwise objectionable;
   vi) breaching terms and conditions of software licensing agreements;
   vii)interfering with the normal operation of computing equipment, facilities, networks or systems by, among other things, flooding the network with messages, sending chain letters or pyramid solicitations;
   viii)using the University's computing equipment, facilities, networks and systems for profit or commercial gain.
c) No student shall destroy, misplace, misfile, or render inoperable any stored information such as books, film, data files or programs from a library, computer or other information storage, processing or retrieval system.

5. Aiding in the Commission of an Offence

No student shall encourage or aid another student in the commission of an offence defined in this Code, or encourage or aid behaviour by a non-student which, if committed by a student, would be an offence under this Code.

6. Alcohol and Drug Use

No student shall contravene the Liquor License Act of Nova Scotia or a provision of the Campus Alcohol Policy, nor shall any student possess, use or sell a drug to which access is restricted by the Narcotics Control Act.

7. False Information and Identification

a) No student shall knowingly furnish false information to any person or office acting on behalf of the University.
b) No student shall forge, alter or misuse any document, record or instrument of identification.
c) No student shall knowingly furnish false information to any person regarding his or her standing, status or academic record at Dalhousie University.

8. Unauthorized Possession of a Firearm or Weapon

No student shall possess a firearm or other weapon on the University premises without the specific written permission of the Chief of Security.

9. Contravention of University Regulations

When a rule, regulation or policy of the University prohibits or proscribes certain conduct but does not provide any penalty for breaches of the rule, regulation or policy, breaches shall be dealt with under this Code.

10.Other

No student shall contravene any provision of the Criminal Code or any other federal, provincial or municipal statute on the premises of the University or in the course of the University's programs or services, or University-approved events or activities.

D. Procedures

1. Whenever possible and appropriate, reason and informal measures shall be used to resolve issues of individual behaviour before resort is made to formal disciplinary procedures.
2. Any person may make a complaint against any student for misconduct. A complaint shall be prepared in writing and directed to the Vice-President, Student Services. Any complaint should be submitted as soon as possible after the event takes place. All complaints shall be presented to the accused student in written form. Along with notice of the complaint the accused student shall be advised of her/his right to be represented throughout the process, including by a Student Advocate.
3. The Vice-President, Student Services, or designate shall conduct an investigation to determine if the complaint has merit and/or if it can be disposed of informally by mutual consent of the parties involved on a basis acceptable to the Vice-President, Student Services, or designate. If an informal disposition of the complaint results, such disposition shall be final, and there shall be no subsequent proceedings.
4. An agreement that a student will withdraw from the University for a period of time, or not re-register, may be part of an informal disposition of a complaint. In such instances this will not be recorded on the student's academic record, but a "block" on further registration may be entered in the student information system.
5. The Vice-President, Student Services, shall report annually to Senate regarding the number and nature of complaints that are disposed of informally.
6. If the complaint cannot be resolved informally through the procedures described in Section 3, or if in the judgment of the Vice-President,

Student Services, it is not appropriate for the complaint to be so resolved, the Vice-President, Student Services, shall refer the complaint to the Senate Discipline Committee for a formal hearing. In determining whether to refer a case to the Senate Discipline Committee, the Vice-President, Student Services, may seek advice from a student Discipline Advisor or other appropriate source.

7. Where there are criminal or civil proceedings pending against the student for conduct related to the complaint, the Vice-President, Student Services, may defer prosecution of the complaint on such terms and conditions as are appropriate in the circumstances (including an interim suspension) until the conclusion of all or part of such proceedings where the circumstances of the case warrant. Conviction of a criminal offence will be considered prima facie evidence of a parallel offence under this Code.
8. Any statements an accused student makes to the Vice-President, Student Services, or designate in the course of an attempt to resolve a complaint informally may not be submitted to the Senate Discipline Committee as evidence.
9. Hearings shall be conducted by the Senate Discipline Committee according to procedures determined by the Committee. In other than exceptional circumstances, a hearing by the Senate Discipline Committee shall occur within sixty calendar days of the referral of a complaint to the Committee.
10. The President or designate shall appoint a person to present the complaint.
11. If a student fails to appear at a hearing, the hearing may proceed, provided that the student has been given adequate notice. Except in the case of a student charged with failing to obey the summons of the Committee or University official, no student may be found to have violated the Student Code solely because the student failed to appear before the Committee. In all cases, the evidence in support of the complaint shall be presented and considered.

E. Sanctions

1. In each case in which the Senate Discipline Committee determines that a student has violated the Student Code, the sanction(s) shall be determined and imposed by the Committee.
2. The following sanctions may be imposed upon any student found to have violated the Student Code:
   a) **Warning –** A notice in writing to the student that the student is violating or has violated institutional regulations.
   b) **Probation –** A written reprimand for violation of specified regulations. Probation is for a designated period of time and includes the probability of more severe disciplinary sanctions if the student is found to be violating any institutional regulation(s) during the probationary period.
   c) **Loss of Privileges –** Denial of specified privileges for a designated period of time.
   d) **Restitution –** Compensation for loss, damage or injury. This may take the form of appropriate service and/or monetary or material replacement.
   e) **Discretionary Sanctions –** Work assignments, service to the University or other such discretionary assignments that are considered appropriate by the Discipline Committee.
   f) **Conditions –** Conditions may be imposed upon a student's continued attendance.
   g) **University Suspension –** Suspension of the student from the University for a specified period of time, after which the student is eligible to return. Conditions for readmission may be specified.
   h) **University Expulsion –** Permanent separation of the student from the University.
3. More than one of the sanctions listed above may be imposed for any single violation.
4. Other than expulsion from the University and suspension for the duration of its effect, disciplinary sanctions shall not be made part of the student's academic record, but shall be kept on file in the Office of the Vice-President, Student Services, for use in the event of further breaches of this Code.
5. No student found guilty of an offence under this Code shall refuse to comply with a sanction or sanctions imposed under the procedures of this Code. Such refusal will constitute grounds for the imposition of additional sanctions.
6. The Committee may direct that a sanction be held in abeyance if a student's registration at the University is interrupted for any reason.

F. Interim Suspension

In the following circumstances, the President of the University, or a designate, may impose an interim suspension prior to the hearing before the Committee.

1. Interim suspension may be imposed only: (a) to ensure the safety and well-being of members of the University community or preservation of University property; (b) to ensure the student's own physical or emotional safety and well-being; or (c) if the student poses a threat of disruption or of interference with the operations of the University or the activities of its members.
2. During the interim suspension, students may be denied access to specified campus facilities (including classes) and/or any other University activities or privileges for which the student might otherwise be eligible, as the President or the designate may determine to be appropriate.
3. A student who is the subject of an interim suspension may request a hearing before the Senate Discipline Committee on the issue of the interim suspension itself. This request shall be submitted in writing, with reasons, to the Secretary of Senate. The Committee shall hear the matter, including submissions by the President or designate, within ten working days, and shall have the authority to confirm, negate, or alter the terms of the interim suspension.

Protection of Property

1. Dalhousie University is the owner and/or occupier of the lands and buildings which comprise its campuses. In addition to all other processes set out in this Calendar (including the Code of Student conduct), the University reserves the right to exercise all rights and remedies available to it pursuant to any statute, by-law, regulation, ordinance, order, or otherwise, in order to protect campus property and those who use it.
2. Without limiting the foregoing, Dalhousie University may issue a notice against a student pursuant to the *Protection of Property Act* prohibiting entry to all or part of the campuses or prohibiting a particular activity or activities on all or part of the campuses, where circumstances warrant. Such a notice may be issued either separately or in conjunction with the procedures set out in the Code of Student Conduct. The notice may be in force for the period stated in the notice which will normally be for up to one calendar year. If considered appropriate by the Vice-President, Student Services, a notice may be renewed for further periods.
3. A notice under the *Protection of Property Act* may also be issued by Dalhousie University in relation to the Student Union Building at the request of the Student Union. In the case of urgent or emergency situations, such a notice may be issued immediately. If the Student Union request is to have a prohibition extend beyond seven (7) days for a registered Dalhousie University student, the Student Union shall make a written request to the Vice-President, Student Services, providing detailed reasons for the request and the process followed leading up to the request for the notice, including details of when the student was advised that his or her behaviour or activities were inappropriate and ought to cease, the reasons provided to the student, and whether the student was afforded the opportunity to respond or to rectify behaviours or cease the inappropriate activity.
4. A Dalhousie University student may appeal any notice issued against him or her under the *Protection of Property Act* in writing to the Vice-President, Student Services.

Suspension or Dismissal from a Program on the Grounds of Professional Unsuitability – Faculty of Health Professions

The Faculty of Health Professions, acting through its Committees on Studies at the School/College and Faculty levels, and in consultation with the Directors and Dean, may suspend or terminate a student from a program if the student is judged to be unsuitable for the profession in which s/he is studying. Because of the nature of the study and practice of the various health professions, which places care givers in a position of

special trust, certain impairments or some types of conduct unbecoming to a member of a health profession may be grounds for suspension or dismissal.

The following list includes examples of behaviours that might indicate unsuitability for the various health professions. The nature of these behaviours is such that, should any of them ever be repeated, grievous harm could be caused to clients. This list should not be considered to be all inclusive:

1. a criminal act (e.g., assault, sexual assault, fraud, and drug trafficking) which according to established Faculty processes was determined to be of such a nature as to bring disrepute to the profession, or by which in the opinion of the Faculty, the student demonstrated poor judgment, lack of integrity or (other) unsuitability for the profession; or evidence that, on the balance of probability, the student had committed such an act;
2. being under the influence of alcohol or drugs while participating in client care, any other professional activity, or any activity related to the practice of the health profession;
3. in accordance with provisions of the Nova Scotia Human Rights Act, the occurrence of a health condition that impairs essential performance required for the health profession;
4. unethical behaviour as specified by the code of ethics/standard of practice of the health profession.

The student's situation will be considered with discretion throughout the investigation of the allegation of unsuitability and these deliberations shall determine whether suspension, dismissal or neither is recommended. The principles of natural justice and due process will be observed in all investigations.

Any member of the University community can bring to the attention of the Director behaviours that are deemed unsuitable. These behaviours will be investigated and allegations heard.

Appeals will follow the appeal procedure for academic matters within the Faculty of Health Professions notwithstanding that the criteria are different. At the University level, appeals will require formation of an *ad hoc* Senate Committee.

Guide to Responsible Computing

In recognition of the contribution that computers can make to furthering the educational and other objectives of the University, this Guide is intended to promote the responsible and ethical use of University computing resources. It is in the best interests of the community as a whole that these resources be used in accordance with certain practices which ensure that the rights of all users are protected and the goals of the University are achieved.

This Guide applies to all computer and computer communication facilities owned leased, operated, or contracted by the University. This includes word processing equipment, micros, mainframes, minicomputers, and associated peripherals and software, regardless of whether used for administration, research, teaching, or other purposes.

It should be noted that system administrators of various campus computing facilities and those responsible for the computer access privileges of others may promulgate regulations to control use of the facilities they regulate. System administrators are responsible for publicizing both the regulations they establish and their policies concerning the authorized and appropriate use of the publicly available equipment for which they are responsible.

A. Basic Principles

Individuals should use only those University computing facilities they have been authorized to use. They should use these facilities:

1. with respect to the terms under which they were granted access to them;
2. in a way that respects the rights of other authorized users;
3. so as not to interfere with or violate the normal, appropriate use of these facilities;
4. so as not to impose unauthorized costs on the University without compensation to it.

B. Elaboration

1. Individuals should use only those University computing facilities they have been authorized through normal University channels to use. They should use these resources in a responsible and efficient manner consistent with the objectives underlying their authorization to use them.
2. Individuals should respect the rights of other authorized users of University computing facilities. Thus, they should respect the rights of other users to security of files, confidentiality of data, and the benefits of their own work. Users should respect the rights of others to access campus computing resources and should refrain from:
   a) using the computer access privileges of others without their explicit approval;
   b) accessing, copying, or modifying the files of others without their permission; and
   c) harassing others in any way or interfering with their legitimate use of computing facilities.
3. Individuals should respect the property rights of others by refraining from the illegal copying of programs or data acquired by the University or other users or putting software, data files, etc. on University computers without the legal right to do so.
4. Individuals should not attempt to interfere with the normal operation of computing systems or attempt to subvert the restrictions associated with such facilities. They should obey the regulations affecting the use of any computing facility they use.

C. Disciplinary Actions

Reasonable suspicion of a violation of the principles or practices laid out in this Guide may result in disciplinary action. Such action will be taken through normal University channels.

Nothing in this Guide diminishes the responsibility of system administrators of computing services to take remedial action in the case of possible abuse of computing privileges. To this end, the system administrators with the approval of the President and with due regard for the right of privacy of users and the confidentiality of their data, have the right, to suspend or modify computer access privileges, examine files, passwords, accounting information, printouts, tapes, and any other material which may aid in an investigation of possible abuse. Whenever possible, the cooperation and agreement of the user will be sought in advance. Users are expected to co-operate in such investigations when requested. Failure to do so may be grounds for cancellation of computer access privileges.

Faculty of Graduate Studies

Office of the Dean

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Administrative Officers

Dean
Watters, C.R., BSc, MSc, MLS (Western), PhD (TUNS)

Associate Dean - Postdoctoral Fellows and Professional Development
Marche, S.M., BA (RMC), MEd (Alberta), PhD (LSE)

Associate Dean - Scholarships and Programs
Pelzer, D.J., MD (Heidelberg), DSc (Homburg)

Program Officer
Fletcher, W., BA, BEd (Dalhousie), MA (Calgary)

Admissions and Convocation Officer
Nowlan, H., BSc (Saint Francis Xavier)

Administrative Officer
Scott, M.

Scholarship Officer
Walsh, D.

Faculty Council (2007-2008)

Abidi, R., 2008 Health Informatics
Bliemel, M., 2009 Business School
Cada, M., 2007 Electrical & Computer Engineering
Cohen, S, 2008 Classics
Faridi, S., 2009 Mathematics & Statistics
Gardiner-Barber, P., 2008 Sociology& Social Anthropology
Girard, P., 2009 Law
Grindley, B., 2010 Chemistry
Ingles, J., 2010 Human Communication Disorders
Madani, A., 2009 Agriculture
Marche, S., Associate Dean
Marin-Misener, R., 2008 Nursing
Palermo, F., 2008 Planning
Pelzer, D., Associate Dean
Satish, M., 2010 Civil & Resource Engineering
Thompson, J., 2009 English
Tillotson, S., 2008 History
Tirone, S., 2009 Health & Human Performance
Warkentin, A., 2008 Mechanical Engineering
Watters, C., Chair
Whitehead, H., 2009 Biology
Wranik, D., 2010 Public Administration

Faculty Regulations

The Manual for Policies, Governance and Procedures is available on the Faculty of Graduate Studies web site: http://www.dalgrad.dal.ca/governance. Detailed information about particular programs will be found in the Departmental entries in the subsequent sections of this calendar, or may be obtained from Departmental publications. It is the responsibility of all graduate students to familiarize themselves with the regulations which govern the conditions of their programs of study at the University. Except where noted, Faculty of Graduate Studies regulations take precedence over Faculty/Departmental regulations. The Faculty of Graduate Studies regulations are subject to change. Up to date regulations can be found on the Faculty of Graduate Studies web site: http://www.dalgrad.dal.ca/regulations/. The Faculty of Graduate Studies forms are available on the Faculty of Graduate Studies website at http://www.dalgrad.dal.ca/forms. Forms are updated on a regular basis.

I. Graduate Programs

Graduate programs are offered at Dalhousie University in a variety of research and professional fields at the Diploma, Master's and Doctoral level.

1.1 Degree Programs

Departments in the Faculty of Graduate Studies offer programs leading to the following degrees and diplomas:

- Doctor of Philosophy (PhD)
- Doctor in the Science of Law (JSD)
- Master of Applied Computer Science (MACSc)
- Master of Applied Health Services Research (MAHSR)
- Master of Applied Science (MASc)
- Master of Applied Science (Biomedical Engineering) with Diploma in Prosthodontics
- Master of Applied Science/Master of Planning (MASc/MPlan)
- Master of Architecture (MArch)
- Master of Architecture (Post-Professional) [MArch (Post-Prof)]
- Master of Arts (MA)
- Master of Business Administration (MBA)
- Master of Business Administration (Financial Services) [MBA(FS)]
- Master of Business Administration/Master of Engineering (MBA/MEng)
- Master of Business Administration/Bachelor of Laws (LLB/MBA)
- Master of Computer Science (MCSc)
- Master of Development Economics (MDE)
- Master of Electronic Commerce (MEC)
- Master of Engineering (MEng)
- Master of Engineering/Master of Planning (MEng/MPlan)
- Master of Environmental Design Studies (MEDS)
- Master of Environmental Studies (MES)
- Master of Health Informatics (MHI)
- Master of Health Services Administration (MHSA)
- Master of Health Services Administration (International) (MHSA(I))
- Master of Health Services Administration/Master of Business Administration (MHSA/MBA)
- Master of Health Services Administration/Bachelor of Laws (LLB/MHSA)
- Master of Health Services Administration/Master of Nursing (MN/MHSA)
- Master of Information Management (MIM) pending approval
- Master of Laws (LLM)
- Master of Library and Information Studies (MLIS)
- Master of Library and Information Studies/Master of Business Administration (MLIS/MBA)
- Master of Library and Information Studies/Bachelor of Laws (LLB/MLIS)
- Master of Library and Information Studies/Master of Public Administration (MLIS/MPA)
- Master of Library and Information Studies/Master of Resource and Environmental Management (MLIS/MREM) pending approval
- Master of Marine Management (MMM)
- Master of Nursing (MN)
- Master of Nursing/Master of Health Services Administration (MN/MHSA)
- Master of Planning (MPlan)
- Master of Planning Studies (MPS)
- Master of Public Administration (MPA)
- Master of Public Administration (Management) [MPA(Mgmt)]
- Master of Public Administration/Bachelor of Laws (LLB/MPA)
- Master of Resource and Environmental Management (MREM)

- Master of Resource and Environmental Management/Master of Library and Information Studies (MREM/MLIS) pending approval
- Master of Science (MSc)
- Master of Science (Clinical Vision Science) with concurrent Graduate Diploma in Orthoptics and Ophthalmic Medical Technology
- Doctor of Medicine/Master of Science (Oral and Maxillofacial Surgery) (MD/MSc)
- Master of Social Work (MSW)
- Graduate Diploma in Public Administration (GDPA)

1.2 Program Administration

Graduate programs at Dalhousie are administered at the Faculty level and at the unit and program level.

1.2.1 Unit/Program Level

At the unit level all graduate programs are administered through a Graduate Coordinator.

1.3 Program Definition and Fee Requirements

At Dalhousie, the graduate studies academic year is divided into three terms: Fall (September-December), Winter (January-April), and Summer (May-August). Graduate degree programs are based either on a program fee structure (e.g., a one-year program) or a per-class fee structure (e.g., a 10-class program).

Program Fee Degrees

Most graduate programs at Dalhousie University have a minimum period for program fee payment and residency requirements. For example, a student admitted to a one-year, full-time Master's program is required to pay three consecutive terms of full-time program fees. Some Master's programs require students to pay their three terms of full-time program fees over two terms, rather than three terms. Students are expected to register for three consecutive terms unless otherwise given permission to take classes or undertake research elsewhere. If admitted to a two-year, full-time program, students (either Master's or Doctoral) are required to pay full-time program fees for 6 consecutive terms.

Students continuing beyond their initial program fee requirement period will be assessed continuing fees on a per-term basis. Students must maintain **continuous registration** until their program requirements are complete or granted a formal Leave of Absence. Students in Master's thesis programs should normally expect to take 6 to 12 months beyond the program fee requirement period to complete their studies. Students in Doctoral programs should expect to take 12 to 24 months beyond the program fee requirement period to complete their studies.

Students entering or switching to a part-time Master's program are required to pay the part-time equivalent of full-time program fees. In other words, part-time Master's students will pay the same amount of fees as a full-time student at a rate of 3 part-time terms being equivalent to one full-time term. For example, a Master's student entering a one-year, part-time Master's program must pay 9 consecutive terms of part-time fees. Master's students entering a two-year, part-time Master's program must pay 18 consecutive terms of part-time fees. If a Master's student completes a part-time program earlier than the 9 (one-year) or 18 (two-year) terms, they will be required to pay part-time program fees for any outstanding terms before they are approved for graduation. Part-time Master's students who do not finish their degree requirements in the required number of part-time, program terms, must register and pay fees on a part-time continuing basis.

There are no part-time PhD programs at Dalhousie.

It should be noted that under the program or continuing fee, students may take only the courses approved by the department on the student's Graduate Program Form.

Program fee students include those in the following programs: LLM, JSD, MA, MSc, PhD, MArchPP, MASc, MCSc, MACSc, MEC, MEDS, MEng, MES, MHI, MMM, MN, and all combined programs (MN/MHSA, MHSA (I), LLB/MBA, LLB/MHSA, LLB/MLIS, MD/MSc, MD/PHD, MASc/MURP, MASc/MPLAN, MEng/MURP, MEng/MPLAN).

Per-Class Fee Degrees

Some graduate programs at Dalhousie University are based on a per-class fee and students pay fees according to the number of classes they take in any given term. All such degrees have a minimum number of classes required to be completed for graduation. Per-class fee degrees apply to the following programs:

- Master of Architecture
- Master of Business Administration (1 Year Program)
- Master of Business Administration (2 Year Program)
- Master of Business Administration (Financial Services)
- Master of Engineering (Internetworking Only)
- Master of Health Services Administration
- Master of Library and Information Services
- Master of Planning
- Master of Planning Studies
- Master of Public Administration
- Master of Resource and Environmental Management
- Master of Social Work
- Master of Urban and Rural Planning
- Qualifying, Visiting or Special Graduate Students

Fee schedule can be found on the Student Account's website at: http://as01.ucis.dal.ca/stdacct/fees.cfm

1.3.1 General Program Definitions - Master's Level

Master's programs are usually structured in one of three ways: 1. classwork plus a thesis; 2. classwork plus a graduate project; or 3. classwork only. Some programs also have a work or internship component in addition to classwork and project/thesis requirements, and this usually adds to the time necessary for completion.

Program Length (Fee Requirement)	Classwork plus Thesis	Classwork plus Project	Classwork Only
One-Year Program Fee: one-year program fee, followed by continuing fees as required; or per class fees	Class credits as specified by the program, (normally completed in one year) and a thesis	Class credits as specified by the program, and a graduate project	Class credits as specified by the program
Two-Year Program: Fee: two years of program fees, followed by continuing fees as required; or per class fees	Class credits as specified by the program, (normally completed in two years) and a thesis	As above	As above

NOTE: Term classes are normally equal to one-half credit.

Master's programs or combined Master's/Diploma programs exceeding the requirements for a two-year program are considered as three year programs and fees are applied accordingly.

1.3.2 General Program Definition - Doctoral Level

All Doctoral programs at Dalhousie require a full-time residency period and full-time program fees as defined below.

Residency: Students are required, as part of their Graduate Student Program, to be on campus for at least four terms in the first four years of their program.

Two-Year Fee: For students who enter with a first-class thesis Master's degree. Fee: two years of program fees followed by continuing fees until degree completion.

Three-Year Fee: For students who enter directly from first-class undergraduate degree with honours standing equivalent to a Dalhousie honours degree or students who transfer from a Master's program. Fee: three years of program fees followed by continuing fees until degree completion.

Registration: **Continuous registration is required.**

II. Admission Requirements for Graduate Programs

Please note that entry into Dalhousie's graduate programs is very competitive, and applicants who meet the minimum requirements are not guaranteed admission. Normally, successful applicants have academic records and qualifications that are well above the minimum required.

2.1 Admission Requirements

The Faculty of Graduate Studies sets the minimum admission standards that are required for entry into graduate programs. Individual Departments may require additional qualifications of their candidates, and enrollment limitations usually mean that successful applicants possess qualifications that considerably exceed the minimum requirements. The Faculty of Graduate Studies reserves the sole right to reject applications from candidates who meet or exceed the minimum admission requirements. Final decisions on all admissions are made by the Faculty of Graduate Studies, and there are **no appeals on admission decisions**.

In all cases, candidates for admission must possess degrees which are deemed by the Faculty of Graduate Studies to be equivalent to those granted by Dalhousie University, and which have been granted by institutions that are fully recognised by Dalhousie.

2.2 Master's Degree Program

Candidates for admission must hold at least a Bachelor's Degree with a minimum B average in the last 60 credit hours from a university of recognised standing, with the following conditions:

a. For entry into a Master's program with a thesis requirement, candidates must hold a Bachelor's Degree with an honours or the equivalent of honours standing as granted by Dalhousie University in the area in which graduate work is to be done or an area which is relevant to the graduate work. A four (4)-year Bachelor's degree may be considered as equivalent of honours if there is evidence of independent research capacity (such as a research project as part of a class) or if the degree is officially approved as an honours equivalent. In those cases where a candidate has a three (3)-year degree and a four (4)-year degree honours program was not available to them, first-class candidates will be considered for admission to a two-year program.
b. For entry into all other programs, candidates must hold a Bachelor's Degree with at least four (4) classes, or their equivalent, taken at a senior undergraduate level in the area in which graduate work is to be done or an area which is relevant to the graduate work. Candidates must achieve an average of at least a B in those four classes, as well as the overall B average in the last 60 credit hours for their degree.
c. Some professional programs offer a one-year Master's program for which an honours degree or equivalent is not required for admission. See Departmental Listings for details of individual program admissions.

A small number of mid-career Master's degrees (see 6.4.3) allow entry either with or without a Bachelor's degree, depending on the qualifications of the applicant. Admission to such programs, as with all graduate programs, is at the discretion of the Faculty of Graduate Studies.

2.3 Doctoral Degree Programs

The criteria for admission to Doctoral programs are more rigorous than for Master's programs. The successful completion of a Master's degree does not guarantee admission to a PhD program. Typically a PhD thesis must represent an original contribution which advances the field of learning in the subject. It must be a significant piece of research and only those with a demonstrated ability to perform research at an advanced level will be considered for admission.

Candidates must hold:

a. a first-class thesis Master's Degree, or its equivalent, from a recognised university, for entry into a Doctoral program with a two (2) year program fee and residency requirement, (the identification of a first class Master's degree is based on grades in class work; evidence of a well-written, high quality thesis, and other indicators, such as publications in refereed journals, presentations at scholarly conferences, etc.); or
b. a Bachelor's Degree from a recognised university with a first-class (i.e. a minimum of an A- average) honours standing (including a research dissertation) as granted by Dalhousie University, for entry into a Doctoral program with a three (3)-year program fee and residency requirement.
c. a first-class non-thesis Master's Degree may be considered for admission to the PhD where evidence of independent research can be clearly demonstrated, such as a major research paper, presentation at scholarly conferences, publications in journals, etc. Such candidates may also be admitted into a Master's program with the possibility of transferring into the Doctoral program, as described below.

2.3.1 Transferring from a Master's to a PhD Program

A few departments will admit a Bachelor's graduate with a first-class honours degree into the Master's program and recommend them for transfer to the Doctoral program. Also, in exceptional circumstances a student with a non-thesis Master's degree of first-class standing (average class grade of A- or better) may be admitted into a thesis Master's program with the possibility of transferring into a PhD on the basis of outstanding academic and research potential. Students who wish to transfer from a Master's to a Doctoral program must do so within the first four terms of initial registration. Such requests must be made prior to the term in which the transfer is to take effect.

2.4 English Language Competency

As the standard language of study at Dalhousie University is English, candidates whose native language is not English must demonstrate their capacity to pursue a graduate-level program in English before admission. The standard test is the TOEFL. The Faculty of Graduate Studies sets a minimum acceptable score of 580 for the written TOEFL, 92 for the internet-based test, and 237 for the computer based test. Some programs within the Faculty of Graduate Studies set a higher minimum (especially if the students are expected to be Teaching Assistants, in which case a written TOEFL of at least 600 is normally required). It is also recommended that potential students taking the non-computer TOEFL test should also take the Test of Written English (TWE) component. The following other tests will also be accepted with the following minimum scores: MELAB, 90; IELTS, 7, CanTest, average of at least 4.5 with no band score lower than 4.0; CAEL, 60 overall, with no band score lower than 50. The TOEFL requirement is waived if the applicant has completed a degree at an institution where the language of instruction is English.

Further information on these tests may be obtained from

1. ***Test of English as a Foreign Language (TOEFL)***
   TOEFL/TSE Service
   P.O. Box 6151
   Princeton, NJ
   USA 08541
   toefl@ets.org
   www.toefl.org

2. ***Michigan English Language Assessment Battery (MELAB)***
   English Language Institute (ELI)
   TCF Building
   University of Michigan
   401E. Liberty, Ste 350
   Ann Arbor, MI,
   USA 48104-2298
   melabelium@umich.edu
   www.lsa.umich.edu/eli/melab.htm

3. ***International English Language Testing System (IELTS)***
   University of Cambridge Local Examinations Syndicate
   1 Hills Road
   Cambridge, UK
   CB12EU
   ielts@ucles.org.uk
   www.ielts.org

4. ***Canadian Test of English for Scholars and Trainees (CanTest)***
   CanTEST Project Office
   Second Language Institute
   University of Ottawa

600 King Edward Avenue
Ottawa, ON
K1N 6N5
cantest@uottawa.ca
www.arts.uottawa.ca/ils/eng/cantest_register.html

5. Canadian Academic English Language Assessment (CAEL)

CAEL Assessment Testing Office
School of Linguistics and Applied Language Studies
Carleton University
126 Paterson Hall, 1125 Colonel By Drive
Ottawa, ON
K1S 5B6
cael@carleton.ca
www.cael.ca

2.5 Conditional Admissions

If a conditional admission is approved, the condition must be met within the first term of initial registration, and the Faculty of Graduate Studies may set a shorter time period. If the condition is not met by the appropriate deadline, the student's registration will be terminated. Conditions on admission cannot subsequently be waived.

2.6 Graduate Examination

Some departments require GRE or GMAT scores of applicants as a criterion for admission. Check Departmental Listings in this calendar (see Section XII, page 33) for information on specific program admission requirements.

2.7 Advanced Placement

Upon admission, a student may be granted advanced placement credits based on classes completed previously with a course content equivalent to a graduate course at Dalhousie University. Graduate classes that have not been counted towards a previous degree can be awarded transfer credit (see Section 2, page 21.8). For classes that have been counted towards a previous degree advanced placement does not normally reduce the overall course requirements in the Dalhousie program, but may replace one or more required classes. Advanced placement must be approved by the academic unit and by the Faculty of Graduate Studies, and must be clearly annotated on the student's Graduate Program Form. Advanced placement classes are not noted on the student's Dalhousie transcript. Combined advanced placement, letter of permission, and transfer credits normally cannot exceed 33% of the program's overall course requirements.

2.8 Transfer Credit

A transfer credit allows for courses completed outside of the student's program, normally at another institution, to be used as part of the student's degree requirements. Such courses cannot have been used for credit for another degree, and cannot exceed 33% of the students overall requirements. This total of 33% would also include any courses taken on Letter of Permission - see section 6.6.6, page 27 and Advanced Placement. Transfer credits should be applied for within the first term following admission and must be approved by the department and the Faculty of Graduate Studies. An original transcript and course equivalency is required if the course was not completed at Dalhousie. In order to be eligible courses must satisfy any time period restrictions that may apply.

2.9 Students with Learning Disabilities

See University Regulations.

III. Graduate Application Process

3.1 Faculty Application Forms and Supporting Materials

All applicants for graduate programs at Dalhousie must complete the Faculty of Graduate Studies Application for Admission Form. Students can apply online at http://www.dalgrad.dal.ca/admissions/onlineappguide/. A paper version of the Application Form can be found on the Registrar's web site at: www.registar.dal.ca/forms. The application must be accompanied with the application fee. All supporting materials (including reference letters, official transcripts from all post-secondary institutions attended, official GMAT or GRE scores, official TOEFL scores, etc.) are to be sent directly to the department to which the student is applying. Interdisciplinary PhD Program applicants send all materials to the Faculty of Graduate Studies. **Note that supporting documents (transcripts, letter of reference, etc.) will be verified for authenticity.** Applicants submitting fraudulent documents may have their names published on the listserv of the Association of Registrars of Universities and Colleges in Canada, and have their acceptance rescinded. Documents submitted as part of the application cannot be returned or photocopied for the student.

3.2 Application Deadlines

The Faculty of Graduate Studies normally admits students to commence their programs in the fall term (September). See Admission Dates, page 2. However, some academic units may consider applicants to commence in the winter term (January) or the summer term (May) or may have different deadlines. General Deadlines for application are as follows:

General Application Deadlines	Canadian Applicants	Non-Canadian Applicants
For September Admission	June 1	April 1
For January Admission	October 31	August 31
For May Admission	February 28	December 31

See the individual program descriptions to find out if the program will admit other than in September.

Visa processing is lengthy; therefore international applicants should apply at least two months before the deadline, e.g. by April 1 for September admission.

3.2.1 Specific Program Deadlines

Several programs have different application deadlines. Please refer to the specific departmental sections in this calendar for these dates.

Applicants who wish to be considered for university scholarship support are advised to apply by January 15 (there is no application form for university or faculty scholarships, as all eligible applicants are automatically considered with their application for admission). All eligible candidates should also apply for external awards. Consult with your chosen department to determine scholarship availability and eligibility. Please note, some departments have deadlines that are much earlier than the Faculty of Graduate Studies deadlines.

Applicants who require a student visa and are not funded by the University or an officially recognised funding agency must provide proof of financial ability with their application. Canadian immigration is increasingly rigorous about requiring proof of sufficient financial support to complete the program of studies.

3.3 Departmental and Faculty Approval

All applications are reviewed by the department, and the department then makes a recommendation to the Faculty of Graduate Studies for acceptance or rejection, including any required conditions of admission. At this stage, many departments will contact the applicants to let them know that the department has made a positive recommendation to the Faculty. **While this may be a useful indication to the applicant that their application is progressing, it does not constitute official acceptance into the graduate program, even if it is in the form of a written letter.** Official acceptance is achieved when the Department recommendation has been approved by the Faculty Graduate Studies, and a formal letter of acceptance is issued by the Registrar's Office.

3.4 Official Response

All applicants will receive an official letter from the Registrar's office indicating whether or not they have been accepted into the graduate program. This letter is the only official notification that the university sends out. **All other forms of communication, including letters from the department, do not constitute official acceptance or rejection by the university.**

3.5 Scholarship Awards

Successful applicants who are also approved for a graduate scholarship will receive a letter of notification of their award from the Dean of the Faculty of Graduate Studies. Scholarship offers can be made at the time of an admission offer or later depending upon when the decision on funding is made. **Letters from supervisors or departments do not constitute official offers of financial support by the university.**

3.6 Deferrals

Newly accepted applicants who, for reasons beyond their control, are unable to take up their position on the date for which they were accepted, may request a deferral of their start date to a later term. Students may request a deferral of one, two, or three terms, and no student may receive more than one deferral. Students wishing to request a deferral should contact the department to which they were accepted as soon as possible, and all deferrals are subject to the approval of the Faculty of Graduate Studies. If students request a deferral after they have registered, it is the student's responsibility to cancel their registration.

IV. Registration Procedures and Regulations

It is the student's responsibility to register. Registration is the process by which students officially establish with the University (through the Office of the Registrar) their degree program (MA, MSc, PhD, etc.) and status (full-time, part-time, etc.) and pay the appropriate academic fees (Student Accounts). Both aspects of the process (program/status and fee payment) must be completed before a student can be considered registered. **Graduate students must maintain their registration status on a continuous basis and pay the required fees.**

4.1 Registration Status and Fees for Graduate Students

Program-Fee Programs

Graduate students in program-fee programs must maintain their registration on a continuing basis. In addition to course, project or thesis registration, Program-Fee students must register for REGN 9999 in all three terms. REGN 9999 is listed in the Academic Timetable as "Registration Course - Graduate". If graduate students allow their registration to lapse they will be considered to have withdrawn and will be required to apply for re-admission.

Class Fee Programs

With written approval of the department and the Faculty of Graduate Studies (e.g. for a summer term when no appropriate classes are offered), graduate students in programs where fees are paid on a per class basis can allow their registration to lapse for one term without penalty. Students who allow their registration to lapse for more than one term will be considered to have withdrawn.

Thesis or Project Registration

Once graduate students begin their thesis or project, they must continue to register in their thesis every term and work toward its completion until all degree requirements are met.

4.2 Registration Procedures

All registration is carried out via the web at www.dal.ca/online. Registration information will be available on the Web in late June. Students are encouraged to register early and are reminded that they must keep their mailing address up to date (students may update their mailing address by going on the web or by informing the Faculty of Graduate Studies Office).

Continuing students who require an extension to their program or have an outstanding progress report will not be permitted to register until the extension or progress report has been officially approved by the Faculty of Graduate Studies.

Students who wish to change their registration status by the addition or deletion of classes must report this to the Graduate Studies Office. Changes in status, i.e., part-time to full-time or full-time to part-time, cannot be made after initial registration without permission of the Faculty of Graduate Studies. Changes in registration can only be done at the beginning of a term prior to registration for that term and only with the permission of the Faculty of Graduate Studies.

4.2.1 Registration Deadline

All students must be registered by the deadline for each term. Students who do not register on or before the university's last day to register must apply in writing to the Faculty of Graduate Studies for permission to register. A financial penalty will apply. Any student who fails to register by the official deadlines will not receive any service whatsoever from the University during that term. Continuing students who fail to register by the final deadline will have to apply for readmission during the next available admissions cycle (see 4.2.5).

4.2.2 Failure to Register (Program Fee Students)

Students who fail to register within the approved deadlines will be considered to have lapsed registration. Such students will not be permitted to submit a thesis nor will they receive any services from the University during that academic term. Students who allow their registration to lapse will be considered to have withdrawn and will be required to apply for readmission. (See section 4.2.5.1).

4.2.3 Withdrawal

Students who withdraw from a degree program are to immediately inform the Graduate Coordinator of their program and the Faculty of Graduate Studies in writing. The immediacy of notification is important since the amount and speed of possible fee reimbursement is influenced by the date of withdrawal. Students must contact Student Accounts directly to make arrangements to receive their fee reimbursement. **A withdrawal is not official until it has been approved by the Faculty of Graduate Studies and received in the Registrar's Office. Under no circumstances will the Faculty of Graduate Studies back-date a withdrawal notice**.

4.2.4 Academic Dismissal

A student may be required to withdraw from a program for academic reasons (e.g., failure to meet admission or program requirements or lack of academic progress), for academic offences such as plagiarism, irregularities in the presentation of data, etc., (see Intellectual Honesty, page 11 and Senate Discipline Committee, page 12), for non-academic reasons, (see Code of Student Conduct, page 14), or for failing to maintain registration status (see 4.1 above). The student will be notified by the appropriate body of the reason for the required withdrawal. Academic work completed at another institution, while on Academic Dismissal can not be used for credit at Dalhousie.

4.2.5 Readmission of Students

A student who is academically dismissed may apply in writing to their department for immediate reinstatement (see 6.6.2 1 and 2, page 26 Grading Policy). Upon the recommendation of the graduate coordinator and approval by the Faculty of Graduate Studies, a student may be immediately reinstated only once during the course of their program.

A student who is withdrawn for academic reasons, voluntarily withdraws, or whose registration has lapsed may apply for readmission within ten years of initial registration. Readmission is not automatic because of the competition for places with incoming students. A student who is academically dismissed and not immediately reinstated may not apply for re-admission to the Faculty of Graduate Studies for at least 12 months following the official date of the withdrawal.

4.2.5.1 Readmitted students (program fee students)

Students who fail to register and pay tuition fees for any term before the degree program requirements have been fulfilled, are considered to have withdrawn and will be required to apply for readmission. Readmitted program fee students (except those who were withdrawn for academic reasons) must pay fees for the terms in which they were not registered, to a maximum of three terms at the current continuing fee rate.

Readmitted students who were academically withdrawn will not be charged make-up fees for the three terms immediately following the official date of withdrawal. Make-up fees will be charged for any term thereafter, to a maximum of three terms, until the student is registered.

Students in thesis programs who have not maintained registration are normally required to have a satisfactory thesis in hand or a timetable for completion approved by the department's Graduate Coordinator and signed by the student and thesis supervisor, before they can be readmitted. Students may be readmitted only once during the course of their program. Application for readmission must meet normal application deadlines, and all outstanding fees must be paid.

4.2.5.2 Readmitted students (per course fee students)

With written approval of the department and the Faculty of Graduate Studies, graduate students in programs where fees are paid on a per-course basis can allow their registration to lapse for one term per academic year without penalty (e.g. for a summer term when no appropriate courses are offered). Students who allow their registration to lapse for more than one term will be automatically withdrawn and must reapply and pay fees for the terms they were not registered at the current continuing fee rate, to a maximum of 3 terms.

4.2.6 Concurrent Registration

A student may, with the Dean's permission, register for two concurrent programs or diploma programs, either at Dalhousie or one at Dalhousie and one elsewhere, for a maximum of twelve months, usually the first academic year of the Dalhousie graduate program. This does not apply to a Dalhousie student finishing a Master's degree who has been accepted into a PhD program. In that case, the student must first complete the Master's and then register in the PhD program in January, May or September as applicable and approved by the department. If the student fails to complete the Master's degree for a particular entry point, the department must request deferral of the admission to the next available start date.

4.3 Student Categories

All graduate students must be registered in each year and in each term of their graduate program in one of the categories listed below. Students wishing to change status from full-time to part-time or vice versa, must submit their request, with departmental approval, to the Faculty of Graduate Studies. Such requests must be made prior to the start of the term in which the change of status is to take effect.

4.3.1 Full-Time Student (Program Fee)

A full-time graduate student paying program fees (see section 1.3, page 19) is a student who has been approved by the department and the Faculty of Graduate Studies as working full-time on their graduate degree. All Doctoral students register full-time throughout their studies, and pay full-time fees for the first two or three years of study, as designated at the time of admission, and continuing fees for subsequent terms. Program fee students pay fees on a per term basis three times a year and must maintain their registration for the summer, fall and winter terms. The following programs pay fees for two terms per academic year only: LLM, MEC, MHI, MAHSR and MSc(HUCD).

4.3.2 Full-Time Student (Per Course Fee)

A student who is taking a minimum of nine credit hours per term is considered full-time. In determining full-time or part-time status for Master of Architecture - First Professional and Master of Planning, thesis hours will be considered; please consult the fee schedule.

4.3.3 Part-Time Student (Program Fee)

At the masters level a part-time student paying program fees (see Section 1.3, page 19) is a student who has been approved by the department and the Faculty of Graduate Studies as working part-time on their graduate degree. A part-time graduate student cannot carry more than 8 credit hours per term. Program fee students pay fees on a per term basis three times a year and must maintain their registration for the summer, fall and winter terms.

4.3.4 Part-Time Student (Per Course Fee)

A student who is taking less than nine credit hours in a semester is considered part-time.

4.3.5 Continuing Student (Program-Fee Programs Only)

A student in a program that charges a program fee and who has completed the program fee requirement but has not yet finished all the degree requirements (usually the thesis). The student is required to pay a Continuing Fee on a per term basis.

4.3.6 Qualifying Student (Master's only)

Students who hold a recognized undergraduate degree as defined in section 2.2, page 20, but who do not meet all admission requirements for a specific program, may be recommended for admission to a qualifying program. Admission to a qualifying program may be recommended by academic units for students in the following circumstances.

a. The student has the required GPA in a recognized undergraduate degree program but may not have the required background for graduate studies in a specific discipline. The academic unit will specify the required advanced undergraduate classes that must be completed with B- or higher marks to qualify for admission to the graduate program.
b. The student does not meet the overall GPA requirements for admission to graduate programs. The academic unit will specify a set of advanced undergraduate classes that, upon satisfactory completion, will raise the GPA to the level defined in section 2.2., page 20.

Qualifying students can be full-time or part-time; take as little as one half-credit (0.5) class or as many as ten one-half (10 x 0.5) credit classes chosen from undergraduate classes or a mixture of undergraduate and graduate classes. If advanced placement for the graduate classes is anticipated, this information must be specified in the comments section of the application form. Because it is a prerequisite, a qualifying program cannot be used to reduce the length of a subsequent regular graduate program. Qualifying students are not eligible for scholarship or bursary support and must apply for admission to the appropriate graduate program in the usual way towards the end of the qualifying period. Qualifying students must pass all the classes with no grades below a B- and an average of at least B, and fulfil any other requirements in order to be considered for admission.

There is no Qualifying Year for Doctoral students, however, some departments admit students to the Master's program first and then consider them for transfer into the Doctoral program at a later date (see Section 2.3.1, page 20).

4.3.7 Special Student-Graduate Studies (SSGS)

With permission of the Faculty of Graduate Studies, students are sometimes permitted to take a graduate class outside of a program. The registration category for non-program students taking graduate classes is Special Student-Graduate Studies (SSGS). Such students, may normally take a maximum of two full-credit classes (four half classes) with the permission of the class instructor and the appropriate graduate coordinator. Because all graduate classes must be taught at a consistent standard to graduate level students, non-program students must have records which meet the minimum entrance requirements and follow the same application procedure as for a graduate program. Hence they must be approved by the Faculty of Graduate Studies as admissible to a graduate program and should adhere to the same application deadlines as much as possible.

Students are ineligible to apply for Special Student status in a class if they have been declined admission to the program on account of academic standing, or have been academically withdrawn from the program.

Students who register in this category do so normally as an enrichment to their professional fields. Students trying to qualify for entry to a graduate program must follow a different route: either a Qualifying Year program, if eligible, or a program of study as a Special Student in an undergraduate faculty.

Classes completed under SSGS status cannot be used for credits towards formal graduate programs. Exceptions can be granted only by the Faculty of Graduate Studies at the time of admission.

4.3.8 Visiting Student Graduate Studies (VSGS)

Students registered as graduate students at another university may register at Dalhousie to take courses on a Letter of Permission from their home university or the Canada-wide CUGTA form, or they may register to conduct research under the supervision of a Dalhousie professor on a Visiting Research Student Application Form from their home university. Visiting students must have records that meet the minimum entrance requirements for the course for which they are registering.

4.3.9 Letters of Confirmation

A letter confirming a student's registration and/or scholarship status can be produced on request. Students should contact the Faculty of Graduate Studies Office for information on this service. Confirmation letter request forms are located on the Faculty of Graduate Studies web site: www.dalgrad.dal.ca/forms/student/#conf

4.4 Leave of Absence

The Dean of Graduate Studies may approve a Leave of Absence for medical reasons or because of a serious problem outside the student's control with supporting documentation. The student's Graduate Coordinator must recommend the Leave and it can be for a maximum length of one year per individual program.

An application for a Leave of Absence is available at www.dalgrad.dal.ca/forms/student/#loa and must be completed by the student, in consultation with the student's supervisor.

4.4.1 Terms of a Leave of Absence

Students may not hold any Dalhousie Scholarships during a leave of absence, nor may they study elsewhere and receive credit at Dalhousie University.

An official Leave of Absence does not count toward time in a program (in effect, the clock stops ticking).

A leave of Absence frees a student from paying tuition fees, it also releases the university from providing student services such as consultation with professors and library privileges.

4.4.2 Parental Leave

Parental Leave will be granted, without prejudice to academic standing or eligibility for financial support, at the time of pregnancy, birth or adoption. A parent may request up to three terms of leave, which must be completed within twelve months of the date of birth or custody. Where both parents are graduate students seeking parental leave, the total number of terms may not exceed four. While on parental leave, students do not register or pay fees to the University. Any refund of fees will be governed by university regulations. Parental leave not only frees the student from the necessity of paying fees, it also releases the university from the obligation to provide the student with services. These include consultation with professors and library privileges. Only under well-documented extenuating circumstances, will retroactive approval be given for parental leave.

4.4.3 Periods and Application Deadlines for Leaves of Absence

A Leave of Absence is granted on a per term basis: fall, winter and summer. Students may request successive term leaves, up to a maximum of three terms (one year) during the course of their program.

Applications for a Leave of Absence must be received according to the deadlines listed in the schedule of Academic Class Add/Drop Dates on page 1 of this calendar.

Under no circumstances will retroactive approval be given for a Leave of Absence.

4.5 Program Continuance

Prior to the start of a student's thesis stage and with their Graduate Coordinator's support, the Dean of Graduate studies may approve a program continuance. The purpose of the Continuance is to allow student to take part in an exceptional academic or career opportunity and maintain their student status as "in good standing" for a maximum duration of one year. Please see the following web address for the application form and further details. http://www.dalgrd.dal.ca/forms/dpcs/Request_Program_Continuance.doc

4.6 Suspension of Studies

Unexpected emergencies that arise during the term cannot be accommodated by a Leave of Absence. Such cases can be accommodated through a suspension of program but no fee rebate is possible. A student must apply in writing to the Faculty for a suspension of program stating the reasons and the length of time requested, and it must be supported by the Graduate Coordinator. A suspension relieves the student from responsibilities for completing classwork and other program requirements during the period of suspension, but it does contribute to time in the program (*i.e.* the clock does not stop ticking). Normally, a suspension of studies shall be for no longer than one term. Disposition of courses registered for during a term of suspension of studies must be agreed upon by the department, and approved by the Faculty of Graduate Studies.

4.7 Differential Fees for International Students

Non-Canadian students are required to pay an additional Differential Fee (the amount being determined by the university) in addition to the regular fees according to the following schedule:

Full-time Master's student (except Oral and Maxillofacial Surgery) 2 years (or equivalent)
Full-time Master's/MD student Oral and Maxillofacial Surgery..... 4 years
Part-time Master's student ..... 6 years
2-year, full-time PhD student (following a Master's degree)..... 3 years
3-year, full-time PhD student (following a Bachelor's degree)..... 4 years

The annual graduate program differential fee is charged over two terms for programs requiring two terms of fee payment.

This fee is applied to each new graduate degree in which the student registers.

Per-course fee Master's students' differential fee is changed per term in proportion to course registration(s).

4.8 Identification (ID) Cards

Full-time, part-time and continuing students in a degree program, will receive ID cards entitling them to University services. Distance education students should consult their department. ID cards must be presented to write an officially scheduled examination or to use the library facilities. In addition, some services such as the issuance of bursary or scholarship cheques, require the presentation of a valid Dalhousie ID.

4.9 Notification of Address

Students are required to ensure that address changes are kept up-to-date. This should be done on Dalhousie Online: www.dal.ca/online. Select "Update Address(es) and Phone(s)" from the Personal Information menu and add the new address. Select the type you wish to add and click the "insert" button. Notifications from the University will be sent to the most recent address on the student information system; students will be held responsible for complying with these notifications, and non-receipt of material because of failure to report a change of address will not excuse students from such responsibility.

4.10 Student Email Addresses

The University issues an @dal.ca email address to all students. This is the official email address and the only email address that the University will use for communication with students regarding academic and administrative matters. This address is entered automatically in the Student Information System as the preferred email address, it will be the address to which all general email messages to students will be sent, and it will be the address provided to faculty members when they request distribution lists for the sending of messages to students in their classes. A message sent by the University, or a faculty or staff member, to your @dal.ca address will be considered to have been delivered to you. Students should visit my.dal.ca for detailed instructions on how to activate their @dal.ca account.

V. Intellectual Property and Conflict of Interest

At all times, faculty members and graduate students must maintain the highest levels of integrity in their research, teaching, and educational endeavours.

5.1 Conflict of Interest

Faculty members and students are expected to declare any conflict of interest of a personal or financial nature which may influence explicitly or implicitly their participation in graduate programs and graduate administration. In a small community such conflicts are sometimes unavoidable. It should nonetheless be possible to avoid conflict of interest in the following cases:

No faculty member shall evaluate in a teaching context or supervise the thesis or project of a student who is a daughter, son, spouse, partner or other close relative, or a faculty colleague in the same department.

No student or supervisor shall have a financial or family interest in the industry or business in which the student is pursuing his/her thesis research. If a student is employed by the company in which the research is being conducted or the student's research is marketable under terms of the supervisor's grant or contract used to provide support for the student, protection must be given to the student's contribution to the research by means of an appropriate contract, finalized before the research for the degree is commenced and signed by all parties involved.

No graduate student can teach a graduate class without completing all the preliminary program requirements and then only with the permission of the Dean, Faculty of Graduate Studies and on the understanding that the graduate student is not the "professor of record". The class must not include any of the graduate student's peers (e.g. a PhD student can teach only Master's students). Graduate students in programs offered in the Faculty of Engineering are not permitted to teach graduate classes.

5.2 Intellectual Honesty and Plagiarism

All students should read and be familiar with the University policies on Intellectual Honesty, as described in the University Regulations section of this Calendar.

5.3 Policy on Integrity in Scholarly Activity

In accordance with the Senate Policy on Integrity in Scholarly Activity, the Faculty of Graduate Studies has adopted guidelines which focus upon the involvement of graduate students in research and scholarly activity. Guidelines are available on the Senate web site: www.senate.dal.ca/policies.cfm.

5.4 Policy on Intellectual Property

The Faculty of Graduate Studies is developing a policy on Intellectual Property, which will be available on the Faculty of Graduate Studies web site: www.dalgrad.dal.ca.

If students and/or faculty have concerns or doubts about any issue pertaining to any part of Section 5, consult with your Chair, Graduate Coordinator, or Supervisor, or contact the Faculty of Graduate Studies for advice. If you feel uncomfortable with approaching your immediate supervisor, then go to the next level and ask to be heard in confidence.

VI. Degree Requirements

Graduate students have a maximum period of time within which to complete all of the requirements for their graduate program.

The normal upper time limits for the completion of degrees are:

One-year Master's, full-time:	Four years
One-year Master's, part-time:	Five years
Two-year Master's, full-time:	Five years
Two-year Master's, part-time:	Seven years
PhD and JSD, full-time only:	Six years
MBA-FS:	Seven years
MPA (Management):	Seven years

6.1 Program Forms

Every graduate student must have an individually approved program of studies. The program or course of study for each graduate student must be approved by the Graduate Coordinator in each department or program and submitted for final approval to the Faculty of Graduate studies. The graduate Coordinator will enter the proposed program (with the total number of credits required, the names and numbers of all classes required (including ancillary classes), and any other requirements and conditions) on the graduate Student Program form. The form must be signed by the students and the Graduate Coordinator before the submission to the Faculty of graduate Studies. The signed form must be submitted to the Faculty within the first term of the students' program of studies. Once approved, the Program Form constitutes an agreed contract between the student and the university and is used to audit the student's file for graduation. Any changes to the approved Program Form must be agreed to by the Graduate Coordinator and the Faculty of Graduate Studies by way of a Program Update Form. Forms are available at: http://dalgrad.dal.ca/forms/gc/.

6.2 Annual Progress Report

Every graduate student in the second year and beyond of a Thesis Program is required to submit an Annual Progress Report to the Faculty of Graduate Studies, through their supervisor and graduate coordinator. This report is due on an annual basis, one month prior to the anniversary of the student's admission date. Failure to submit this report may result in delays in registration and funding.

Students who have external funding administered by the university are required to submit annual progress reports one month in advance of the one year anniversary of the start date of their award. This report will also satisfy the FGS progress report requirements.

Forms available at: www.dalgrad.dal.ca/forms/student/

6.3 Extensions

A first extension of one year may be granted by the Faculty of Graduate Studies on the recommendation of the department, along with a satisfactory Progress Report form completed and signed by the student and the supervisor. Under no circumstances can a student be registered in a program for more than 10 years.

Requests for one further one-year extension, the Final Extension, must include a Progress Report form for the previous year together with a detailed plan and timetable for completion of the thesis within the following twelve (12) month period. The student is then expected to defend and submit the approved thesis within that academic year. A further extension will only be given for one term to provide for necessary revisions to the thesis following defence.

6.4 Requirements for the Master's Degree

Two types of Master's degree are offered: one based primarily on research (involving a thesis) and the other based primarily on formal classes. The class-based programs are usually terminal degrees, while the thesis-based programs can lead to Doctoral studies. Master's programs may also have additional requirements such as graduate projects, practicums, or internships.

6.4.1 Thesis-based Master's Degrees

The course of study for the research degree (MA, MASc, MArch, MCSc, MSc, MDE, MEDS, MES, MURP and the thesis options available in the LLM, MArch (Post-Prof), MEDS, MEC, MHI, MSc in Human Communication Disorders, MN, MLIS and MSW) may include graduate classes, seminars, preparation of fields of study, comprehensive examinations, demonstrations of foreign language proficiency, a thesis, and oral presentation and defence of the thesis.

Requirements vary considerably from program to program, and even within the same program, depending upon student's previous experience and qualifications.

6.4.2 Class-based Master's Degrees

Non-thesis Master's programs include the MACSc, MBA, MEng, MHSA, MMM, MPA, MREM, MPLAN and non-thesis options in the MArch (Post-Prof), MEC, MEDS, MHI, LLM, MCSc, MN, MLIS and MSW, and certain MA and MSc programs. The number of classes varies and a graduate research project is often required.

6.4.3 Specialty and Mid-Career Master's Degrees

A number of specialty Master's degrees have been and continue to be developed to meet specific needs and demands for graduate education in commerce, public service, and industry. Some but not all of these programs are degrees designed for mid-career professionals. These are primarily class-based programs, with some component of work and professional experience (either as part of the program or as pre-requisites for admission). All or part of the classes may be offered in a distance education mode. They currently include the MBA (Financial Services), MPA (Management), MEng (Internetworking), and EMEC (Executive Masters of Electronic Commerce).

6.5 Requirements for the Doctoral Degree

A candidate must demonstrate the ability to carry out research of high quality leading to an advance of knowledge in his/her area of study. In general, at least four (4) terms must be spent in full-time study on the Dalhousie campus. The candidate's course of study will be initiated with the advice and direction of a supervisory committee. The Supervisory Committee must consist of the research supervisor and at least two (2) other members. The course of study must include a preliminary examination and/or a comprehensive examination (to be taken in the second year of the program, or not later than the beginning of the third year, and in no case less than one (1) year before submission of the thesis) and preparation and oral defence of a thesis.

The course of study may include classes, seminars, comprehensive examinations, qualifying examinations, preparation of fields of study, demonstrations of foreign language proficiency, and any other requirements considered necessary for the clear demonstration of post-Master's-level comprehension, scholarship, and ability in the candidate's particular area of study. Comprehensive exams are only taken after all classwork is completed.

6.6 Classes and Grades

Classes may be full or half year (full or half credit respectively) and may be designated by the candidate's committee as "Required" (pass mark is B-) or "Ancillary" (normal undergraduate pass mark). Some departments cross-list postgraduate classes with senior undergraduate classes in which case the requirements for graduate students are more demanding than those for undergraduates.

If a student is permitted to take an undergraduate class (with an appropriate additional work requirement as approved by the FGS Curriculum Committee) as part of their graduate classwork, the minimum B- grade also applies.

In those Doctoral programs that require completion of a specific number of graduate credits, students are not permitted to take undergraduate classes for credit, although such classes may be included within the required program of studies (i.e., they are in addition to the required number of graduate credits).

6.6.1 Academic Transcript

The academic transcript is a reflection of academic progress and, therefore reflects both passes and failures. It cannot be altered after the fact. Accordingly, it is essential that students be fully aware of the deadlines for adding and withdrawing from graduate classes.

6.6.2 Grading Policy

All instructors of graduate classes (i.e., designated 5000 and above), with the exception of a few classes for which a pass/fail grading scheme has been approved, will use the following grading scheme:

Letter Grade	Numerical (%) Equivalent
A+	90-100
A	85-89
A-	80-84
B+	77-79
B	73-76
B-	70-72
F	< 70

Pass Standard

1. Faculty of Graduate Studies regulations stipulate that graduate students must achieve a minimum, or passing, grade of "B-" in all classes required of their degree program, (except those in programs listed in 2. below). Any lower grade will be recorded as a failure. A student who fails to meet these requirements in any year is immediately and automatically withdrawn (academically dismissed) from the program. However, such a student may apply, in writing, to the department for immediate reinstatement, (see 4.2.5, page 22 Readmission of Students). Reinstatement to a program after a failing grade must be supported by the Graduate Coordinator, and must be approved in writing by the Faculty of Graduate Studies. If readmitted, any subsequent "F" will result in a final program dismissal. Note that any academic withdrawal and reinstatement will be recorded on the student's official transcript.
2. In the following programs, Architecture, Business Administration, Computer Science, Engineering, Electronic Commerce, Library and Information Studies, Occupational Therapy, Public Administration, students are allowed to carry one failing grade. However, no credit will be granted for the failing grade and the class must be repeated or replaced and a grade of "B-" or better obtained. (Failed core classes must be repeated, electives may be repeated or replaced at the discretion of the department). Failure of a second class results in immediate academic dismissal. However, such a student may apply, in writing, to the department for immediate reinstatement, (see 4.2.5, page 22 Readmission of Students), for approval by the Faculty of Graduate Studies. If readmitted, any subsequent "F" will result in a final program dismissal.

6.6.3 Ancillary Classes

Undergraduate classes recommended by a department as advisable additional background to the degree program, but not specifically required for that program, are termed ancillary classes and must normally be taken in a department other than the one in which the student is registered. The pass grade in these is the same as for the undergraduate faculty unless otherwise specified by the department. Ancillary classes must be listed on the Graduate Student Program form but do not count towards the required number of classes for the graduate program. Normally students are limited to one ancillary class (6 credit hours) during their program. Students who take ancillary classes on a Letter of Permission are responsible for the tuition fees at the other institution.

Students are not permitted to register for undergraduate classes that are not part of their program requirements, as listed on their Program Form, unless they do so as a "Special Student Undergraduate" (SSUG). Classes taken as an SSUG must be admitted, registered and paid for separately. SSUG classes will appear on the student's transcript under the distinct heading of Special Student Undergraduate, and will not be included as part of the student's graduate program.

6.6.4 Audits

Students may take one audit (equivalent of 6 credit hours) in each residency year of their formal program. Audits must be listed on the Program of Graduate Studies form, and must be relevant to the student's program of study. For program fee students, audits not approved as part of their program of study will be subject to additional tuition on the student's account. Per course fee students will be charged the normal audit tuition for each audit registration. Audits cannot be taken on Letter of Permission and will not be approved as part of a Qualifying program.

6.6.5 Independent Study, Directed Readings, and Special Topics

Students may not register for more than two independent study, directed readings or special topics classes in any graduate program and require written approval of the Graduate Coordinator of the unit. This approval includes expectations, marking scheme and time to completion.

6.6.6 Letters of Permission and Classes Taken Outside Dalhousie

(i) Dalhousie is a member of CAGS (Canadian Association for Graduate Studies). With the approval of their program and the Faculty of Graduate Studies, students registered in a program at a CAGS member university (the home institution) may take courses for credit at another CAGS-member university (the host institution). Documentation required is a request form that is completed by the Deans and Graduate Chairs of the host and home institutions. For the Canadian University Graduate Transfer Agreement (CUGTA) form and guidelines, See http://dalgrad.dal.ca/forms/students/#cugta. For CAGS member universities, see www.cags.ca/indexe.html.

Classes approved by the Department and Faculty of Graduate Studies (after examination of class descriptions) can be taken at other universities as part of the graduate degree program provided the class is not available at Dalhousie.

Students may not take classes outside Dalhousie for graduate credit unless prior approval has been given by the Faculty. Classes are not approved retroactively.

The maximum number of classes taken outside Dalhousie University shall normally be confined to 33% of the class requirements except in cases where a university-level agreement, governing specific cooperative arrangements, has been negotiated and is in operation.

The normal regulations governing grading policy (6.6.2, page 26) apply to classes taken at other institutions (e.g., a C+ on a graduate class taken elsewhere will be deemed an "F" in the student's program and may render him/her liable to academic withdrawal). Students who fail a class may not replace that class as a CUGTA or Letter of Permission except by special permission from the Faculty of Graduate Studies.

Dalhousie will normally pay the tuition for students who pay a program fee to take classes offered at other Maritime universities, to the equivalent cost of a Dalhousie course, provided the class is not available at Dalhousie. Students who are required to take classes at other institutions outside the Maritimes will be considered on a case by case basis, e.g. if the class is a necessary component of a student's program. For an approved class taken at a university outside the Maritimes, Dalhousie will reimburse fees to the equivalent cost of a Dalhousie course. Any course charges above that amount are the responsibility of the student. Students who receive approval to take classes at institutions within or outside the Maritimes for convenience or for non-academic reasons do so at their own expense.

Graduate Students who pay a program fee must be registered at Dalhousie and have paid appropriate fees before receiving approval.

Students who pay on a per class fee basis are responsible for paying fees for classes taken outside Dalhousie. Per class fee students must be in good academic standing, with no holds on their registration before receiving approval.

(ii) Credit Courses at Non-CAGS Universities

Dalhousie graduate students may take courses for credit at a university that is not covered by CUGTA. Regulations are the same as described for applications using the CUGTA form. See forms at: http://dalgrad.dal.ca/forms/students/#cugta

6.6.7 Withdrawal From Classes

The last dates for adding and deleting classes are published in the schedule of Academic Class Add/Drop Dates at the front of this calendar. For withdrawals within this period, the class and the withdrawal is not recorded on the academic record. After theses dates, the student is responsible for the content of the class and receives a grade for it. Where a student withdraws from their entire program "W" (withdraws) will be added to their transcript. Please refer to the online Faculty of Graduate Studies calendar regulations section 6.6.7 for further information on "W" for graduate courses.

Students may not transfer from full to part-time status by withdrawing from classes after the deadlines listed in the schedule of Academic Class/Add Drop dates.

A class may be added or dropped on the web at www.dal.ca/online by the deadline listed in Academic Class Add/Drop Dates on page 1) of academic dates/deadlines).

Please note that dropping or changing classes may affect your eligibility for student aid.

Non-attendance does not, in itself, constitute withdrawal. Withdrawals are effective when a student withdraws from classes on the web at www.dal.ca/online or written notification is received at the Office of the Registrar.

6.6.8 Incomplete Classes

A student who fails to complete the required work for a particular class during the normal period of the class will receive a grade of "F". However, where circumstances warrant, a grade of "Incomplete" (INC) may be assigned. Subsequent completion of the work following the end of the class may result in a change of grade by the class instructor, as long as the work is completed before the following deadlines:

Fall term classes .....February 1
Winter and Regular (Sept.-April) term classes.....June 1
May-June classes.....August 1
May- August classes.....October 1
July-August classes.....October 1
MBA(FS) - Please consult departmental entry.

For GPA purposes a grade of INC holds a credit value of 0.0.

After these deadlines, an "INC" cannot be changed without permission of the Faculty of Graduate Studies.

Where the formal deadline for completion of work is beyond the INC deadline, the class instructor can request the Faculty of Graduate Studies to extend the INC for an approved period of time.

At the discretion of the class instructor, alternate arrangements for examinations, tests or the completion of assignments may be made for students who are ill, or in other exceptional circumstances.

6.6.9 Incomplete due to Illness

Where illness is involved, a certificate from the student's physician is required. This certificate must indicate the dates and duration of the illness, and should describe the impact it had on the student's ability to fulfil academic requirements, and any other information the physician considers relevant and appropriate. To obtain a medical certificate, students who miss examinations, tests or the completion of other assignments should contact University Health Services or their physician at the time they are ill and should submit a medical certificate to their class instructor as soon thereafter as possible. Such certificates will not normally be accepted after a lapse of more than one week from the examination or assignment completion date.

For exceptional circumstances other than illness, appropriate documentation, depending on the situation, will be required.

Requests for alternate arrangements should be made to the instructor in all cases. The deadline for changing a grade from ILL to a letter grade is as follows:

Fall term classes .....February 1
Winter and Regular (Sept.-April) term classes.....June 1
May-June classes.....August 1
May-August classes.....October 1
July-August classes.....October 1

All outstanding grades, including ILL or INC, must be addressed prior to registration for the next term. If grades are still outstanding into the next term and no arrangements have been made, students may be required to re-register in the class.

6.6.10 In Progress Classes

The grade of "In Progress" (IP) may be used only to report thesis classes, research project classes, and those designated as "open to independent completion of study." Final submission of grades for project and independent study classes is April 30 for Fall term classes and August 31

for Winter term classes. Students must continue to register for the class each term until a final grade has been assigned.

6.6.11 Academic Standards

When the work of a student becomes unsatisfactory, (including insufficient progress), or a student's attendance is irregular without sufficient reason, the Faculty of Graduate Studies may require withdrawal from one or more classes, or academic dismissal from the Faculty.

VII. Examinations

There are four types of examinations for graduate students: 1. Class Examinations; 2. Qualifying or Preliminary Examinations, 3. Comprehensive Examinations; and 4. Thesis Examinations. This section deals with 1., 2., and 3. Thesis examinations are covered in Section 9.

7.1 Class Examinations

Examinations will normally be the method of grade assessment in graduate classes. There are no supplementary examinations for Graduate Students. Refer to Grading Policy 6.6.2, page 26 for information on grade scheme.

7.2 Qualifying or Preliminary Examinations

Some Doctoral programs require Qualifying or Preliminary Examinations. These occur early on in the Doctoral program (often within the first year) and are sometimes used to assess the transfer of a student from a Master's to a Doctoral program. The exam may take the form of the presentation and defence of a Doctoral research project, or it may involve a written or oral examination.

7.3 Comprehensive Examinations

These examinations in the candidate's area of study are part of Master's degree programs in some departments and all PhD degree programs. Refer to particular departmental entries for details. It is the responsibility of departments to make the necessary arrangements for these examinations. The PhD Comprehensive Examination should be taken in the second year of the program or not later than the beginning of the third year. In no case should the Comprehensive be held less than one year prior to the submission of a thesis for defence. Comprehensive exams may only be taken after the completion of all required classwork.

The Comprehensive Examination may be oral, written, or both and covers subjects relevant to the general area of the candidate's research and teaching competency. Departments are required to set out their rules on PhD examinations in writing and to give a copy to each PhD student on or before registration and to the Faculty of Graduate Studies Office if the Departmental handbook provides insufficient detail. Failure to pass will result in academic withdrawal and may result in dismissal. However, on the recommendation of the department a student may be readmitted and permitted to repeat the examination (once) within twelve months of readmission. The Faculty of Graduate Studies Office must be notified immediately upon the successful completion of the examination process, and the result becomes part of the student's official record.

7.4 Academic Accommodation for Students with Learning Disabilities

See page 10 of the University Regulations section of this calendar.

VIII. Thesis Supervisors and Supervisory Committees

All thesis students must have a Supervisor (or co-supervisors) and a Supervisory Committee. In many departments, especially in the natural sciences and engineering, the appointment of a supervisor is a pre-requisite for admission into the program. All graduate research projects must also have an Advisor, and in some departments, graduate research projects also require an Advisory or Guiding Committee. The membership and changes of these committees are part of the student's program form.

8.1 Qualifications of the Supervisor

A thesis supervisor or co-supervisor must be a member of the Faculty of Graduate Studies, and will normally be from within the student's academic department or program.

Depending on the unit, experience on supervisory or examining committees, teaching graduate classes, or acting as a co-supervisor may be necessary before undertaking the role of thesis or project supervisor. Most natural science and engineering departments require faculty research funding as a criterion for supervision. All programs must lodge a copy of their criteria for supervision with the Faculty of Graduate Studies.

A Doctoral student must be supervised by a faculty member with a PhD or its equivalent, and a Master's student must be supervised by a faculty member with at least a Master's degree or its equivalent. Equivalency must be based on a faculty member's record of research activity and supervisory experience. In the case of co-supervision, at least one of the supervisors must have a Doctoral degree or its equivalent (or in the case of a Master's thesis, a Master's degree or its equivalent). In the event of a dispute over equivalency, the Faculty of Graduate Studies' Academic Planning and Curriculum Committee will be the final arbiter. Members holding post-retirement appointments or active in research in retirement cannot normally take on new students to supervise, but they can co-supervise with a full-time member of the faculty.

8.2 Co-supervision

The Faculty of Graduate Studies recognises four types of co-supervision:

1. that dictated by regulation 8.1 above where a co-supervisor is added because the other supervisor does not have an appropriate academic qualification (e.g. a Doctoral degree or equivalent);
2. that which arises from the desire of a student to draw equally upon the expertise of two individuals, or where an interdisciplinary project may require the equal expertise of two supervisors from different disciplines;
3. that which introduces a new faculty member to the standards of the department by providing an opportunity to work with an experienced supervisor; and
4. that which conforms to the Faculty of Graduate Studies practice regarding external supervisors or supervisors not from the student's department or program. An Adjunct faculty member may be the academic supervisor of a Dalhousie student provided the student also has an internal advisor (see 8.3 below) to handle the administrative details. This is usually done to support the student within the department and the University, rather than for any reasons of academic need.

8.3 Internal Advisor

Not all units give the internal advisor the status of a co-supervisor. In those units where university-level agreements exist for the cooperative governance of the program or where successful involvement of an external supervisor has occurred to the unit's satisfaction, the internal advisor is not necessarily a co-supervisor, the implication being that in a vote on a thesis, the external supervisor has an independent voice.

8.4 Supervisory Committees

All departments maintain supervisory committees for graduate students in thesis programs, and many maintain them for graduate research projects as well. Supervisory Committees are selected by the supervisor in consultation with the student, and should complement the expertise available to the student in completing their research program. The selection of all Supervisory Committees and changes is approved and recorded on the student's program update form. It is in the selection of Supervisory Committees that the greatest involvement of Adjunct members of the faculty occurs.

Supervisory Committees should meet at least twice a year during the thesis research period and more often in the writing stages of a student's program. Normally the agreement of all committee members is required before a department brings forward a thesis for examination.

8.5 Guidelines for the Supervision of Graduate Students

The responsibilities and rights of students, supervisors and departments outlined in the sections below have been developed for students in thesis programs, however, where appropriate units are encouraged to adopt these practices also for project students and their supervisors.

8.5.1 Selection of Supervisor

In the Sciences, where students are not normally admitted until their research areas have been identified and faculty members have agreed to supervise them, a potential difficulty should be drawn to the attention of new students: some restriction of students' freedom to follow their own lines of research may result from dependence upon supervisors' research grants for a significant portion of their income. In extreme cases, students may feel that they are being used by supervisors for their own ends. When such conflicts of interest arise, the graduate coordinator and the candidate's supervisory committee should play a significant role in overseeing the development of the research and in protecting the student against over-specialization.

In the other disciplines that do not assign supervisors at the time of admission, the selection of a supervisor should be based primarily upon competence in the field of the proposed thesis topic. Within this restriction, the department should seek to accommodate the student's choice of supervisor, although it is not obliged to guarantee the choice. Departments are expected to maintain guidelines for determining the number of thesis supervisions a faculty member can concurrently undertake.

8.5.2 Responsibilities of Supervisors

When faculty members accept the supervision of graduate students, they assume several responsibilities:

- to provide reasonable access to students and to be available for consultation at relatively short notice;
- to be as helpful as possible in suggesting research topics and in assisting students to define their theses;
- to tell students approximately how long it will be before written work, such as drafts of chapters, can be returned with comments;
- to be thorough in their examination of thesis chapters, supplying, where appropriate, detailed comments on such matters as literary form, structure, use of evidence, relation of the thesis to published work on the subject, footnoting, and bibliographical techniques, and making constructive suggestions for rewriting and improving the draft;
- to indicate clearly when a draft is in a satisfactory final form or, if it is clear to the supervisor that the thesis cannot be successfully completed, to advise the student accordingly;
- to know the departmental and University regulations and standards to which the writer of a thesis is required to conform, and to make sure that the student is aware of them;
- to continue supervision when on leave, possibly with arrangements also being made for members of the supervisory committee to assist the student for the leave period;
- to advise and help the student to approach other faculty members for assistance with specific problems or even to request the reading of a chapter or section of the thesis;
- to see that all ethics and animal care approvals as appropriate, are secured.

8.5.3 Responsibilities of Students

When graduate students undertake the writing of a thesis, they assume several responsibilities:

- to choose a topic (often with the supervisor's help) and to produce a thesis that is essentially their own work;
- to produce a thesis which meets the standards of scholarship required by the University and the department, including demonstration of their capacity for independent scholarship and research in their field;
- to acknowledge direct assistance or borrowed material from other scholars or researchers;
- to realize that the supervisor has undergraduate or other duties which may at times delay the student's access to the supervisor at short notice;
- to give serious and considered attention to advice and direction from the supervisor;
- to submit their work to the judgment of the department and to abide by its decision when any rights of appeal, if exercised, have been exhausted;
- to know the departmental and University regulations and standards to which the writer of a thesis is required to conform;
- to comply with all ethics and animal care requirements.

8.5.4 Rights of Supervisors

Supervisors have the following rights:

- to expect students to give serious and considered attention to their advice concerning what they regard as essential changes in the thesis;
- to terminate supervision and advise the student to find another supervisor if the student does not heed advice and ignores recommendations for changes in the thesis, or if the student is not putting forth a reasonable effort;
- to have their thesis supervision properly credited by the department as an intrinsic part of their workload so that, in the assignment of duties, they are not overburdened to the point of having their effectiveness impaired as supervisors;
- to have the thesis-writer acknowledge, by footnoting, all portions of the supervisor's own research over which the supervisor wants to retain future rights of authorship;
- to have thesis-writers give permission for the results of their research to be used for the benefit of a larger project when they are working as assistants with their supervisor on research that is part of such a project — this is always with the understanding that students will retain scholarly credit for their own work and be given acknowledgment of their contribution to the larger project.

8.5.5 Rights of Students

Students have the following rights:

- to have a clear understanding of what is expected in thesis writing (expected length, acceptable methodology, validity of topic, notification of progress);
- to expect help from their supervisor in establishing a feasible topic and in solving problems and assessing progress as the thesis is being written;
- to receive a fair assessment of the completed thesis and explanations of negative criticism;
- to be allowed to have a new supervisor when they can offer convincing reasons to the department for the change and the change can be reasonably accommodated by the department;
- to be protected from exploitation by their supervisor or other faculty members if the latter should :
  a) intrude upon the student's right of authorship or fail to give a student authorship credit for team research (where applicable, the department's protocols on authorship should be provided to students before they embark on research), or
  b) divert the student's efforts from the timely completion of the thesis;
- to submit a thesis even if the supervisor is not satisfied, although such action should be taken only in extreme cases and after full consultation with the department.

8.5.6 Responsibilities of the Department

Departments have certain responsibilities in supporting and maintaining their graduate programs:

- to provide necessary facilities and supervision for each student admitted, and not to accept more candidates than can be offered effective supervision (Therefore departments should consider carefully such matters as faculty retirements, sabbatical leaves, teaching loads, and library resources before admitting each student with a declared research interest. When, as is often the case in many disciplines, applicants are unable to choose a field of research until they have had some experience in graduate study or in a particular department, the department should still regulate admissions according to the number of faculty members available for supervision);
- to uphold a high academic standard for theses;
- to provide adequate supervision at all times, so that, when a supervisor leaves the University for another permanent position, substitute arrangements are made as soon as possible;

- to allow students to change supervisors if their research interests shift or develop in a new direction and a change of supervisor will not deprive them of financial support and if the change can be reasonably accommodated by the department;
- to provide procedures which assist and encourage students to complete the thesis, such as early review and approval of topic and methodology, guidelines on access and appeals, oversight of the students' schedule, and a clearly stated system of thesis review and evaluation;
- to regard supervision of graduate students as a major consideration in making replacement appointments for faculty;
- to encourage students to give papers as they proceed, so that they can test their ideas on a wider audience than the supervisory committee;
- to ensure that the graduate coordinator acts as a general overseer of students' progress;
- to instruct all students (or see that they attend Faculty-level workshops) on research ethics;
- to explain to students the University's policies on intellectual property rights.

IX. Thesis Regulations

9.1 Ethical Review

All thesis research involving human subjects must be approved by a Human Ethics Review Board. Reviews are coordinated through the Office of Research Services, Room 321, Henry Hicks Academic Administration Building. Application guidelines are available from the Human Research Ethics Office. Students should allow six to eight weeks for processing. To ensure proper reporting, projects which require approval by a hospital research ethics board must be accompanied by a letter which identifies the proposal as a student thesis research project. Students are required to include a copy of all ethics approvals with completed thesis and projects.

9.2 Preparation of Manuscript and Submission of Theses

Thesis manuscripts must be prepared in accordance with Faculty of Graduate Studies guidelines.

9.2.1 Preparation of Graduate Theses

All graduate theses, whether for Master's or Doctoral degrees, must be completed according to the formal Faculty regulations for thesis preparation and submission. All thesis students must obtain a copy of these regulations, and students are responsible for ensuring that their theses comply with all aspects of these regulations. Failure to do so may cause delays in completion, and may even result in the cancellation of a scheduled defence or examination.

For all graduate students: the Faculty of Graduate Studies Thesis Format Guidelines are available on the Faculty of Graduate Studies web site.

The regulations give details on: Originality; Format and Style; the Order of Contents; Mailing Costs; and other pertinent information.

9.2.2 Thesis Originality and Editing

The thesis must represent a coherent body of original work by the student. It must display a scholarly approach and thorough knowledge of the subject.

Plagiarism in any form is completely unacceptable (http://plagiarism.dal.ca/).

In some disciplines it may be appropriate for the thesis to include published or submitted manuscripts, papers, or reports authored or co-authored by the student. Students who wish to pursue this option must have the prior consent of their supervisory committees, and must obtain appropriate copyright permission.

It is expected that the student has made a substantial contribution to any such manuscripts. Where co-authored manuscript(s) are included in the thesis, the student's contribution must be clearly indicated. (http://dalgrad.dal.ca/forms/tdc/#manuscriptcontribution). The publication or acceptance of such manuscripts before the thesis defence in no way supersedes the examination committee's evaluation of the work, including requesting revisions.

The thesis is the primary and permanent record of the student's work. As such, it is important that it both be written by the student (with appropriate editorial advice as needed) and conforms to normal academic standards. Assistance in improving writing skills is available at both the faculty and university levels (e.g., Writing Workshop; http://www.dal.ca/~workshop/). The full Dalhousie Thesis Guidelines, including details on thesis preparation and formatting can be found at http://dalgrad.dal/forms/thesis_regs.doc

9.2.3 Submission and Registration Deadlines

All thesis students must refer to the Schedule of Academic Dates in this calendar for submission deadlines and registration deadlines.
Students must be registered for the term in which they present their approved unbound theses to the Faculty Office, as well as for the term in which they have their defence. Students will not be permitted to submit their thesis or proceed to defence unless they are appropriately registered and all fees have been paid.
Deadlines for the submission of fully completed and approved theses (following examination and revision) are final in all cases. Failure to meet the deadlines will result in additional registration fees being applied.

It is the responsibility of the student to ensure that all regulations have been met. Failure to comply with the regulations can result in delay in graduation.

9.3 Master's Theses

Theses for the Master's degree must be presented not later than the published deadlines (see Academic Dates page 1). Five (5) unbound copies are required (original and four copies).

9.3.1 Supervision and Examination

Students who were registered in a Master's thesis program prior to September 1, 1997 should consult Regulation 9.3 in the 1996-97 Graduate Studies Calendar.

The mode of supervision and examination of Master's theses varies somewhat from department to department. This diversity recognises differences in the nature of theses within Master's programs (such as the differences between Engineering, Sciences and the Humanities/Social Sciences) and differences in the culture of thesis examination within different disciplines at the Master's level. The Faculty of Graduate Studies requires the following minimum arrangements for the supervision and examination of Master's theses:

A. Master's Thesis Supervisory Committee

Each Master's thesis candidate shall have a Supervisory Committee, comprising of at least two faculty members of the student's graduate department, one of whom shall be the supervisor. The supervisor may act as the Chair of the Committee, or an independent Chair may be appointed.

Additional full or adjunct members of the Faculty of Graduate Studies may be appointed as appropriate. Additional members of the Committee who are not members of the Faculty of Graduate Studies, including members of the non-university community (such as a practicing profession), may be appointed to the Supervisory Committee where their particular expertise makes it appropriate. See B.) 3. below.

B. Master's Thesis Examining Committee

Each Master's thesis shall be examined by an Examining Committee, which shall consist of:

1. A Chair, who shall be a department representative (either the Graduate Coordinator or designate) who was not a regular member of the Supervisory Committee. If the Supervisory Committee had an independent Chair, that person may also Chair the Examining Committee. The main role of the Chair is to organise the examination of the thesis, inform the Faculty Office of the membership of the Examining Committee, ensure that the procedures are carried out in an appropriate manner, record the examiners' written comments and the results of the examination for inclusion in the student's file, and inform the Faculty of the outcome of the examination;
2. The Supervisory Committee or at least two members of the graduate faculty appointed by the department at least one of whom shall have not been involved with the supervision or direction of the thesis;

3. Where the Supervisory Committee is part of the Examining Committee, at least one additional member of the graduate faculty shall be appointed who may be from the candidate's graduate program or department, but preferably should be from outside the involved program or department. The additional examiner must not have been involved with the supervision and direction of the thesis and must be in a position to render an objective and impartial assessment of the quality of the work. Where appropriate, the additional examiner may be from a graduate faculty of another university. With permission of the Dean, the additional examiner may be a non-faculty member (such as a practising professional who does not hold an Adjunct appointment with the Faculty) where it is deemed that they have the appropriate professional and academic qualifications and expertise to assess a graduate thesis. Departments may also use an External Examiner in a manner similar to that used for the examination of Doctoral defences (i.e., the thesis cannot be approved without the agreement of the External Examiner).
4. The Dean of Graduate Studies (or his/her designate) may appoint a Faculty representative if it is deemed necessary, or at the request of the student or the Chair of the Examining Committee.
5. The examination of a Master's thesis may be conducted either by use of an oral defence or by written submission of the thesis to the Examining Committee.
   a) Oral Defence: In the case of an oral defence, it shall be public at least to the extent of being open to the faculty members and students of the home department and any other departments that would be interested. Where appropriate, interested members of the academic and non-academic communities beyond Dalhousie University should also be invited. A written description of the outcome of the defence, including written reports of the readers and any changes required, shall be included as part of the candidate's departmental file. The oral defence shall be carried out according to standard procedures, usually involving: a short presentation by the student; questions from the thesis committee (one or more rounds); in camera deliberation by the committee and agreement on the evaluation; presentation of the results of the exam to the student. Questions from the audience may be permitted before the in camera session if desirable.
   b) Written Defence: Examination by written submission must provide for the candidate to be able to respond to the comments, criticisms and recommendations of the Examining Committee through the exchange of written commentary, and be required to make revisions as deemed appropriate by the Examining Committee. In the case of programs that do not normally require an oral defence, the Dean of Graduate Studies may require such a defence if the circumstances warrant or if the Examining Committee or candidate requests it.
6. All theses are either approved or not approved. The categories are:
   a) approved as submitted;
   b) approved upon specific corrections being made (a clear timetable for completion of the revisions must be presented to the student, normally with a maximum of one month to complete the revisions);
   c) rejected but with permission to re-submit a revised thesis for re-examination (a clear timetable for completion must be presented, normally with a maximum of one year to re-submit); and
   d) rejected outright. In all cases, all members of the Examining Committee must submit written examination reports, dated and signed, which shall become part of the candidate's departmental file. The Chair's written report shall summarize the outcome of the examination process, the final decision and any conditions attached. In the case of an outright failure or failure with a right to submit by a specific date, the Graduate Coordinator must send a written notification of failure to the Faculty.

The above regulations are the minimum requirements of the Faculty of Graduate Studies, and some departments or programs may have specific regulations which exceed these requirements. Students must check with their Graduate Coordinator for details on how their department handles Master's thesis supervision and examination.

9.4 Doctoral Theses

Doctoral theses must display original scholarship expressed in satisfactory literary form consistent with the discipline concerned and be of such value as to merit publication.

9.4.1 Doctoral Supervisory Committees

All Doctoral candidates must have a formally constituted Supervisory Committee, consisting of the Thesis Supervisor and at least two other members of the Faculty of Graduate Studies who are knowledgeable in the field of research. Membership of all Doctoral Supervisory Committees must be approved formally by the Faculty.

9.5 Deadline for Graduation

For thesis students the published deadlines for the submission of the copies of the thesis to the Faculty Office in order to be eligible to graduate in May or October are final in all cases.

9.6 Regulations for the Defence of a Doctoral Thesis

All Doctoral theses must be examined in a public oral defence, to be conducted by an examining committee recommended by the department and approved by the Faculty of Graduate Studies. A candidate shall not be permitted to proceed with the oral defence and examination until all of the following requirements have been met: (i) all required classwork completed successfully; (ii) comprehensive examination passed; (iii) thesis title approved; (iv) Examining Committee established; (v) the style and format of the thesis meets the requirements of the University and appropriate copies of the thesis have been submitted as per regulations and deadlines in paragraphs 1-10 below. Normally a candidate proceeds to oral defence with the approval of the supervisor and Supervisory Committee. A candidate may proceed without the consent of the supervisor and committee but a signed declaration included on the Thesis Submission Form is required by the Faculty.

9.6.1 Doctoral Defence Procedures

1. Registration of Thesis Title: The candidate shall register the proposed title of the thesis with the Faculty of Graduate Studies, no later than six months before submission of the completed thesis.
2. Appointment of External Examiner: The Chairperson of the Department (or Graduate Coordinator where appropriate) shall recommend to the Associate Dean three names (with C.V.s) listed in order of preference as submitted by the thesis supervisor (and approved by the Supervisory Committee) for the appointment of an external examiner at least three months before the anticipated date of completion of the thesis. The persons suggested should be acknowledged experts in the field or discipline of the research being examined in the thesis, must not have been directly involved in the student's research in any way, and should possess a Doctoral degree or equivalent, and should normally have demonstrated experience of Doctoral supervision and/or examination. Brief C.V.s should be submitted along with the names. The choice of the external examiner must be approved by the Faculty of Graduate Studies. If the first choice is unacceptable to the Faculty or if that person is unavailable, then the other names will be considered in order of identified priority. the Graduate Coordinator may then confirm the availability of the External Examination and proposed dated and time for the defence. The formal invitation to the external examiner is issued by the Faculty (see para. 7. below).
3. Copies of Thesis Required for Examination: A minimum of five copies of the thesis are required, more if the Examining Committee is larger than the minimum Faculty requirements. The candidate shall submit one unbound copy of the completed thesis to the Faculty of Graduate Studies Office, together with the Thesis Submission Form and a C.V. The thesis will be given a preliminary check by the Faculty for formatting and style. The deadlines for submitting unbound PhD theses to departments (see the Schedule of Academic Dates in the Faculty of Graduate Studies calendar under August, November and February) are also the deadlines for submission of the one unbound copy (with completed PhD Thesis Submission Form) to the Faculty of Graduate Studies (see also para. 5. and 6. below). The copy is then sent

to the External Examiner by the Graduate Studies office once a date and time of defence is determined. At that time the candidate shall provide a copy of the abstract page from their thesis and a brief biographical sketch for publication in a public notice of the defence (this material must be submitted in Word compatible format and emailed to the Faculty Office).

4. Committee and Department Copies: The other four (or more as required) copies of the thesis will be submitted by the candidate to the departmental graduate coordinator, who will distribute them immediately to local members of the examining committee. One copy is held in the departmental secretary's office for use by other interested faculty and students.
5. No arrangements will be made for the oral examination until all these requirements are fulfilled. The examination will be held no earlier than four weeks after submission of the thesis, thereby allowing adequate time for the thesis to be read by the external examiner.
6. In consultation with the Chairperson of the Department, the Graduate Coordinator, and the research supervisor, the Faculty will establish a time and place for the examination.
7. The Associate Dean of Graduate Studies will issue a formal invitation to the external examiner and will send a copy of the thesis (see para. 3 above) to him/her at least four weeks before the examination, with a request to submit a written appraisal (the Examiner's Report - see para. 8) of the thesis with a recommendation for the defence to either proceed or not proceed, no later than one week prior to the date of the defence.
8. The external examiner will submit by mail, fax, or email, a constructively critical and analytical report (the Examiner's Report) to the Faculty of Graduate Studies Office at least one week prior to the scheduled date of the defence. A copy will be sent to the department Chair or Graduate Coordinator. The Examiner's Report must include a recommendation on whether or not the thesis should proceed to defence. Where the recommendation is not to proceed, the report should indicate what, if anything, would be required to make the thesis acceptable. Note that a decision to proceed to defence does not imply that the thesis is approved, only that it is acceptable for defence. The external examiner (and the examining committee) will have questions which must be answered to their satisfaction, and a thesis can be rejected as a result of the defence. The Examiner's Report must not be disclosed to the candidate or the Supervisory Committee prior to the defence (however, see para. 9. below). Normally the external examiner will attend the defence. The department will make every effort to arrange for alternative facilities (such as video- or teleconferencing) if they are appropriate to provide for the external examiner to participate in the defence even though he/she cannot be there in person. In the rare event of the external examiner not attending, a written report, accompanied by detailed questions to be read at the defence on the examiner's behalf should be submitted to the Faculty one week before the defence.
9. The defence will only occur if the External Examiner states that the thesis may proceed. If the External Examiner states that the thesis should not proceed, then the department Chair or Graduate Coordinator may, after consultation with the Supervisory Committee, request that the Faculty approach the next external examiner from their original list to get a second opinion (the candidate may have to provide another copy of the thesis for this purpose). The Associate Dean of Graduate Studies may request additional suggestions for external examiners if necessary. If the second external does not feel the thesis should proceed to defence, then the entire defence procedure will be canceled and the candidate must meet with the Supervisory Committee to determine a course of action to revise and re-submit the thesis at a later date. Within 12 months, a revised and re-submitted thesis may be sent to the original external examiner(s) or an alternative examiner as deemed appropriate by the Faculty of Graduate Studies.
10. If the external examiner recommends that the thesis proceed to defence, notice of the public defence of the thesis will be published and sent to all relevant departments by the Faculty of Graduate Studies. All interested faculty, students, and members of the public will be welcome to attend.
11. Variation of the regulations outlined above may be permitted only with the written permission of the Dean of Graduate Studies.

9.6.2 Oral Examination

The oral examination of a Doctoral thesis is the culmination of the candidate's research program. It exposes the work to scholarly criticism and gives to the candidate the opportunity to defend the thesis in public.

1. Chair of the Defence: The Examination is chaired by the Dean, the Associate Dean of Graduate Studies, or a member of the Panel of PhD Defence Chairs.
2. Examining Committee: The examining committee consists of, the research supervisor or co-supervisors, at least two additional members (who shall normally have been members of the Supervisory Committee), and the external examiner who shall be from outside the University. A departmental representative (the chairperson of the department or a designate) is included as a non-voting member of the committee.
3. Order of Examination Proceedings: (i) the Chairperson opens the defence with a brief description of the proceedings; (ii) the candidate is questioned on the thesis following a summary presentation no longer than 20 minutes; (iii) the Chairperson will give priority to questions from the external examiner and then from the other members of the examining committee in some pre-arranged order; (iv) the audience will then be invited to ask questions; (v) the Chairperson adjourns the examination when the examining committee decides that further questioning is unnecessary, and the candidate and all members of the audience are required to leave the room; (vi) the Chair then presides over the examining committee during its deliberations in camera; (vii) following the in camera session, the candidate is invited back into the room and is informed of the decision of the committee; (viii) the Chair oversees the completion of the signature sheet as appropriate and completes the Defence Report and returns it immediately to the Faculty of Graduate Studies Office.
4. *In camera* Deliberations and Grading: The decision of the Examining Committee is based both on the thesis and on the candidate's ability to defend it. No thesis shall be approved without the agreement of an external examiner, except that a negative opinion of an external examiner who does not attend the examination should not prevail over the unanimous opinion of the other examiners present and voting. The thesis is graded "approved" or "not approved". A thesis can be accepted by the Examining Committee as submitted; accepted on condition that specific corrections are made; rejected with permission to submit a revised thesis; or rejected outright with no possibility of re-submission. It should be stressed that theses can be rejected on grounds of form as well as content. If specific corrections are required, the thesis will be returned to the candidate and a time limit during which the corrections must be completed will be decided upon by the Examining Committee. Specific corrections will normally be left to the satisfaction of the local committee and research supervisor.
5. Proceedings in the Case of Rejection: If the thesis is rejected with permission to submit a revised thesis (within 12 months of the first defence), the revised thesis will be re-read by an Examining Committee, at least two of whose members were on the original committee. The thesis shall be submitted to an external examiner who may be the original external examiner if the Associate Dean of Graduate Studies considers this to be desirable. The candidate shall defend the thesis before an Examining Committee in the usual way. If rejected again, there are no third chances.
6. In all cases, the recommendation for degree must be approved by the Faculty of Graduate Studies and by the Senate.
7. Variation of the procedures stipulated above may be permitted only with the written permission of the Dean of Graduate Studies.

9.7 Thesis Binding

At the time of submitting their unbound, approved thesis (original and a minimum of four copies) to the Graduate Studies Office, a binding fee (currently $100, subject to change without notice) (plus $20 for every copy over the initial five) will be charged to the student's account and must be paid before convocation. This sum will cover the cost of binding. An additional charge will be made (where appropriate) to cover mailing costs, pockets, and use of glossy paper.

The Faculty of Graduate Studies will arrange for the binding and subsequent distribution of theses as follows:

a. One (1) copy is sent to the author.
b. Two (2) copies are sent to the student's Department.

c. Two (2) copies are sent to the University Library which arranges for the production of microform copy to be retained in the National Library, Ottawa and listed in Dissertation Abstracts International or Masters Abstracts International. The National Library can then circulate such copy according to the International Inter-Library Loan Code, with full copyright protection; it also guarantees a permanent record of the thesis. The University Library retains one (1) bound copy in the University Archives.

X. Convocation

Convocation ceremonies are held in May and October.

10.1 Intent to Graduate Forms

Intent to Graduate forms should be submitted to the Registrar's Office by November 15, for May convocation and by July 1 for October convocation. Forms are available on line from the Registrar's Office website at: www.registrar.dal.ca

10.2 Letter of Confirmation for Completion of Degree

When a student has fulfilled all the requirements (including payment of all program or course fee requirements and any continuing fees), for the degree in advance of the official graduation date, a letter to that effect can be obtained from the Faculty of Graduate Studies Office. The Confirmation Letter Request Form is located on the Faculty of Graduate Studies website under Forms and Documents of Students.

10.3 Conferring of Degrees

Successful candidates for degrees are ordinarily required to appear at Convocation in the proper academic costume to have the degree conferred upon them. By special permission of the Senate, degrees may be conferred *in absentia*. Any graduating student who is unable to appear at the convocation is expected to notify the Registrar in writing prior to May 4 for the Spring Convocation, or October 1 for Fall convocation, giving the address to which the degree or diploma is to be mailed.

Detailed information regarding the upcoming ceremony dates, location, dress etc. is available on the Registrar's Office website: www.registrar.dal.ca

10.4 Academic Costume

Graduates of the University are entitled to wear gowns and hoods of black stuff. The distinctive part of the costume is the lining of the hood, which for the various degrees currently offered are as follows:
MA: Crimson silk
MBA: Turquoise silk
MDE: Medium blue/scarlet border
MES: Brown silk
MHSA: Sky blue silk/white border
LLM: Purple silk
MArch: White/two parallel stripes of red corded border
MArch (Post-Prof.): White/vermilion border
MAHSR: White silk/sky blue border with white piping
MASc: Blue/gold border with white piping
MASc/MURP: Peacock blue/gold border with white piping
MCSc: Emerald green/gold border with white piping
MACSc: Emerald green/gold border with white piping
MEC: Emerald green/purple border with turquoise piping
EMEC: Emerald green/purple border with turquoise piping
MEDS White/three parallel stripes of white and vermilion corded border
MEng: Blue/gold border
MEng/MURP: Peacock blue/gold border
MHI: Scarlet silk/emerald green border
MLIS: Mid-forest Green silk
MMM: Navy silk/seagreen border
MN: Apricot silk
MPA: Sky Blue silk
MPLAN: Peacock blue/green corded border
MREM: Brown silk/white border
MSc: Scarlet silk
MSc (Agriculture): Scarlet silk/gold chevron
MSc (DalTech): Blue/white corded border
MSW: Citron silk
MURP: Peacock blue/green corded border
PhD: Black gown faced with yellow silk; black hood with a lining of yellow silk; birretum is the doctor's bonnet of black velvet with yellow cord.
PhD (Eng): Black gown with front panels of royal blue velvet edged with white; the yoke is pointed in the back with velvet edged in white, the sleeves are lined in white and covered half way up with velvet piped in gold; the hood is lined in white with a blue velvet border with gold piping along the inner side of the blue velvet, with a mortar board.
JSD: Black gown faced with olympic blue silk bordered with yellow silk; black hood with a lining of olympic blue silk bordered with yellow silk; birretum is the doctor's bonnet of black velvet with yellow and blue cord.

XI. Appeals

Unit/program and Faculty decisions are subject to the normal appeals procedures that begin with the unit (department, school, faculty or program). If not resolved at the Faculty level, the student may appeal to the Faculty of Graduate Studies on the grounds below. There are no appeals on admission decisions, or decisions on scholarships, grants or bursaries.

The grounds for appeal are limited to the following:
1. procedural unfairness;
2. bias; or
3. irregularity in procedure.

A written appeal must be submitted to the Dean of the Faculty of Graduate Studies within sixty (60) days following a) the event or circumstances appealed, or b) notification to the appellant of the outcome of the appeal at the unit level, whichever is later. The submission must include:
   i) a description of the exact nature of the appeal including a summary of events and chronology
   ii) specific details of the alleged unfairness, bias or irregularity; and any other relevant consideration or information
   iii) the requested resolution of the appeal.

In an appeals process the student has the right to representation. The student is required to inform the Dean, in writing, if s/he will have a representative presenting the appeal.

Decisions of the Appeals Committee are forwarded to the Dean. Students may appeal the final Faculty of Graduate Studies decision to the Senate.

XII. Departmental and Program Listings

The following entries are designed to provide general information about particular graduate programs. Although general Faculty of Graduate Studies requirements apply to all graduate programs, the methods of fulfilling these requirements vary considerably among Departments.

Detailed, up-to-date information is located in departmental publications.

Each Departmental or program entry includes the following information:
1. A list of faculty members engaged in the teaching of graduate classes and/or the direction of graduate research. Faculty members whose major appointments are in other Departments are so indicated. In addition, the names of other researchers in the Department and honorary appointees may be listed. Beside each name there may be a list of keywords indicating the major areas of research expertise and interest of the faculty member.
2. A description of facilities available may be included. Some general regulations may be described.
3. A list of admission requirements in addition to those of the Faculty of Graduate Studies. In some cases the minimum requirements outlined in Section 2 are not sufficient for entry into a particular program. Other particular requirements may be listed.
4. A description of degree program requirements includes:
   a) Minimum time required to complete the program
   b) Tuition Fees (based on the previous year's fees)
   c) Class work required

d) Other academic requirements
e) Thesis requirement
f) Other requirements

5. A representative list of class offerings and brief class descriptions. Not all of the classes will necessarily be offered in a given year.
6. An extensive list of areas of specialization.

XIII. Centre for Learning and Teaching

The Centre for Learning and Teaching (CLT) works in partnership with academic units, faculty members, and graduate students to enhance the practice and scholarship of learning and teaching at Dalhousie University. CLT takes an evidence-based approach to advocating for effective learning and teaching practices, curriculum planning, services to support the use of technology in education, and institutional policies and infrastructure to enhance the Dalhousie learning environment. (See page 301 for more information about CLT services and resources).

Certificate in University Teaching and Learning: The Certificate program is offered to graduate students by the CLT in collaboration with the Faculty of Graduate Studies. The purpose of the program is to assist academic departments in preparing students for their teaching responsibilities and to enhance their professional development opportunities for other careers.

CLT also offers a non-credit course: Learning and Teaching in Higher Education (CNLT 5000). This course may be taken as part of the Certificate program, or separately. CNLT 5000 is a seminar course designed to bring together practical and theoretical aspects of learning and teaching in post-secondary settings.

Agriculture

Location: Nova Scotia Agricultural College
Truro, NS B2N 5E3
Telephone: (902) 893-6360
Fax: (902) 893-3430

Professors

Ablett, R.F., BSc (Reading), MSc (Sterling), PhD (Oregon), Engineering Department and CEO, Atlantic BioVenture Centre, Bioresources, nutraceuticals, cosmeceuticals, value-added product development.

Anderson, D.M., BSA, MSc (Man), PhD (Sask), Plant and Animal Sciences Department. Nutrition and metabolism of the monogastric species; swine, fin fish, poultry, management of swine.

Asiedu, S., BSc (Agr), MSc, PhD (McGill), Plant and Animal Sciences Department. Plant-microbe Interactions, Post-harvest physiology, pathology of horticultural crops, potato physiology, production management.

Astatkie, T., BSc, MSc (Addis Ababa), PhD (Queen's), Engineering Department. Time series analysis, linear, nonlinear and nonparametric regression, and design of experiments.

Benkel, B.F., BSc (Brock), PhD (Ottawa), Canada Research Chair in Agricultural Biotechnology, Plant and Animal Sciences Department. Animal genomics. The use of comparative genomics to identify genes underlying economically important traits in livestock species. Naturally-occuring resistance to disease. The identification of genes conferring disease resistance in animals. The use of genomics-based technologies in breed improvement.

Burton, D.L., BSc (Dalhousie), MSc (Guelph), PhD (Alberta), Engineering Department. Climate change, greenhouse gases, soil microbiology, soil quality, sustainable manure management practices.

Caldwell, C.D., BSc (MtA), MSc (Dal), PhD (East Anglia), Plant and Animal Sciences Department. Crop physiology, carbon & nitrogen assimilation, water relations, cereals & oil seeds management, new crop development.

Duston, J., BSc (Bath), PhD (Aston), Plant and Animal Sciences Department. Fish biology in Aquaculture. Environmental physiology, photoperiodism, biological clocks, osmoregulation, fish life history strategies and age at maturity.

Farid, A., BSc (Bishops), MSc (Shiraz), PhD (Alta), Plant and Animal Sciences Department. Quantitative genetics, animal breeding, population genetics, application of molecular genetics in animal improvement, genetics of growth and carcass composition, sheep production and management.

Fredeen, A.H., BSc (Sask), MSc (Guelph), PhD (Davis), Plant and Animal Sciences Department. Ruminant nutrition, dairy systems analysis, milk composition, dairy products, greenhouse gas emission, pasture-based dairy production, sustainable, ecological organic dairying.

Gray, A.B., BSc (Bishops), MSc, PhD (McGill), Environmental Sciences Department. Plant Pathology. Control of fungal diseases of ginseng, fruit crops and forages.

Lada, R.R., BSc (Hort.), MSc (Hort.) (TNAU, Coimbatore), PhD (Adelaide), Plant and Animal Sciences Department. Environmental stress physiology and metabolism. Biostress defense molecules, inter & intra-plant communication, environmental regulation of plant development, bulking physiology, resource competition modelling.

MacLaren, L.A., BSc, MSc (Alta), PhD (Calif), Plant and Animal Sciences Department. Bovine reproductive physiology, integrin expression, implantation, embryo development, and estrus synchronization.

Madani, A., BSc (Pahlavi), MSc (UBC), PhD (Wash), Engineering Department. Water quality, water table management, subsurface drainage, and irrigation scheduling.

Martin, R.C., BA, MSc (Carleton), PhD (McGill), Plant and Animal Sciences Department. Forage agronomy and sustainable agriculture,

multiple cropping systems, rotational grazing, organic agriculture. Director, Organic Agriculture Centre of Canada.

Nams, V.O., BSc (Toronto), MSc (Alta), PhD (Calif), Environmental Sciences Department. Spatial scales, landscape ecology, gractal analysis, behavioural ecology, and mammals.

Olson, A.R., BA (Augustana), MSc (Wisconsin), PhD (Alta), Environmental Sciences Department. Botany. Mutualistic, commensal and parasitic symbiotic relationships among flowering plants, anatomy of plant diseases, religious world views and their interaction with natural sciences, sexual reproduction of plants.

Robinson, A.R., BSc (Agr), MSc, PhD (McGill), Environmental Sciences Department. Animal biochemistry, protein biochemistry and endocrinology. Environmental analysis.

Rouvinen-Watt, K., BSc, MSc, PhD (Kuopio), Plant and Animal Sciences Department. Carnivore nutrition and physiology. Lipid and glucose metabolism, nutritional genomics, metabolic syndrome and diabetes, thermoregulation energy metabolism, nutrient digestion and excretion, feed evaluation. Diet evaluation and dietary impacts on animal health and performance.

Stratton, G.W., BSc (Agr), MSc, PhD (Guelph), Environmental Sciences Department. Environmental contaminants, industrial wastes, pesticides, microbial aspects of nutrient cycling, biodegradation of environmental toxicants. Head.

Tennessen, T., BSc, MSc, PhD (Alta), Plant and Animal Sciences Department. Applied ethology, domestic animal behaviour, farm animal welfare, green care and the use of farm animals in human therapy. Head.

Associate Professors

Blanchard, J.P., BSc (St. Mary's), BSc (Dal), MSc (Agr. Eng.), PhD (Technical University of NS), Engineering Department. Aquaculture recirculation systems, wastewater management, water quality, solids waste management, food processing.

Brewster, G., BA (Hon), MSc, PhD (Western), Environmental Sciences Department. Soil erosion monitoring and modelling, physical characterization of turfgrass root zone media, soil quality analysis, human impact on soil physical properties.

Clark, J.S., BA (Guelph), MSc (Sask), PhD (North Carolina), Business and Social Sciences Department. Econometrics and time series analysis. Tests of competition under general equilibrium. Statistical and economic aspects of climate change.

Enright, C., BSc., MBA, PhD (Dalhousie), Plant and Animal Sciences Department. Shellfish Nutrition and Production. Aquaculture, aquatic ecology, phytoplankton, production and physiology.

Glover, K.E., BSc (Agr.), MSc (Guelph), PhD (Dalhousie), Plant and Animal Sciences Department, Molecular Biology and Biochemistry. Molecular nutrition studies in ruminant monogastric and carnivore species, with emphasis on the regulation of lipid metabolism by nutrients and effects on animal metabolism including milk production and composition.

Goodyear, S.N., BSc (Agr) (McGill), MSc, PhD (Guelph), Plant and Animal Sciences Department. Vegetable production management and cultivar evaluation, physiology of vegetable crops, ecological/sustainable farming practices.

Gordon, R.J., BSc, MSc (McGill), PhD (Guelph), Canada Research Chair in Agricultural Resource Management, Engineering Department. Wastewater and manure management, water quality, air quality and odour management, constructed wetland systems, climate change. Director of Research.

Havard, P.L., BSc (Agr Eng), MSc, PhD (McGill), Engineering Department. Water and energy conservation, instrumentation and computer control, system modelling.

Mapplebeck, L.R., BSc, MSc (Guelph), Environmental Sciences Department, Greenhouse crop production and floriculture, nursery crop production, plant propagation and culinary/tea/medicinal herbs.

Pitts, N.L., BSc (Agr), MSc (McGill), PhD (Guelph), Environmental Sciences Department. Food chemistry, food quality, food safety, modified atmosphere packaged food, chemical analysis of essential oils.

Percival, D., BSc (Agr), MSc, PhD (Guelph), Environmental Sciences Department. Plant physiology. Environmental regulation of carbon assimilation and metabolism, whole plant water relations, soil fertility and plant nutrition and the subsequent impact on plant growth, development and composition.

Pruski, K.W., BSc, MSc (Alberta), PhD (Wageningen), Plant and Animal Sciences Department. Plant Propogation. Tissue culture propagation technologies, plant physiology, ornamental and fruit crops, potato physiology and post-harvest.

Sanderson, L.L., BSc (Agr.), MSc (Guelph), Business and Social Sciences Department. Qualitative and quantitative research methodologies in the social sciences (survey methodology), farm safety.

Sibley, K.J., BSc (Agr. Eng.), MSc (McGill), Engineering Department. Machine systems and mechanization that improves productivity, efficiency and profitability of agriculture and agri-food industries, Head.

Wang-Pruski, G., BSc (Tian Jin), PhD (Alberta), Plant and Animal Sciences Department. Plant molecular biology and genomics, functional genomics, proteomics, potato genome and gene expression, genetic control of potato tuber quality, genetic and environmental interactions, biotechnology.

Yiridoe, E.K., BSc (Un. of Science and Technology, Ghana), MSc, PhD (Guelph), Business and Social Sciences Department. Agricultural production economics, farm and agribusiness management and natural resource and environmental economics.

Zaman, Q., BSc, MSc (U.of Agriculture Faisalabad), PhD (U. of Newcastle upon Tyne), Engineering Department. Precision agriculture, GPS, GIS, Sensors, remote sensing, VPT.

Assistant Professors

Boyd, N., BSc (Dalhousie), MSc (Dalhousie/NSAC), PhD (Manitoba), Environmental Sciences Department. Integrated weed management systems, horticultural crop production, plant population dynamics and ecology; organic crop production.

Cutler, G.C., BSc (MUN), MSc (SFU), PhD (Guelph), Environmental Sciences Department. Insect biology and ecology, insect toxicology, and development of ecologically sound and pragmatic insect pest management programs.

Dukeshire, S.R., BComm, BA (St. Mary's), MASc, PhD (Waterloo), Business and Social Sciences Department. Dietary decision making and behaviour, injury prevention, predicting and changing human beliefs, attitudes and behaviour, social judgement and decision making, companion animal-human interaction.

Li, H., BS (Zhongshan Univ.), MS (Univ. of Montpellier), PhD (Laval), Environmental Sciences Department. Soil fertility, soil ecology, plant nutrition, plant water use efficiency, precision agriculture, GIS and remote sensing technology and integrated management of horticultural and agricultural systems.

Lynch, D.H., BSc (Agr.), MSc (Agr.) (McGill), PhD (Guelph), Canada Research Chair in Organic Agriculture, Plant and Animal Sciences Department. Organic production systems. Nurtrient cycling in agro-ecosystems. Soil organic matter dynamics. Soil microbiology. Legume physiology. Composting and management of manures and organic wastes.

Martynenko, A., BSc (Ukraine), MSc (Moscow), PhD (Guelph), Engineering Department. Applied physics and biophysics of ecosystems, bio-instrumentation, remote sensing, sensor fusion, intelligent control systems, machine vision and image analysis.

McLean, N., BSc (Agr.), MSc (Macdonald), PhD (Dalhousie), Plant and Animal Sciences Department. Forage legume breeding and biotechnology for improved production and persistence.

Price, G.W., BSc (BC), MSc, PhD (Guelph), Engineering Department. Alternative uses of organic by-products, nutrient management, management of specified risk material (SRMs), soil organic matter dynamics, soil nitrogen dynamics.

Prithiviraj, B., BSc (Agr.) (Annamalai), MSc, PhD (BHU), Plant and Animal Sciences Department. Plant stress physiology, marine bio-products in animal and plant health, plant-microbe interactions, plant pathology, natural anti-infective compounds.

Rupasinghe, H.P.V., BSc (Peradeniya), MSc (Iowa), PhD (Guelph), Environmental Sciences Department. Bio-products, functional foods, nutraceuticals and natural health products; phytochemicals and human health; postharvest biotechnology, shelf-life and quality.

Adjunct Professors

Al-Mughrabi, K.I., BSc (Agr.Eng), MSc (Jordon), PhD (Dalhousie)
Benchaar, C., MSc (Algiers), PhD (Toulouse)
Eaton, L.J., BSc (Acadia), MSc, PhD (Dal)
Flinn, B.S., BSc, MSc (Queen's), PhD (UBC)
Hodges, M., BSc, PhD (Ottawa)
Jeliazkov, V.D., MSc, PhD (Higher Institute of Agriculture, Bulgaria), PhD (Mass)
MacLeod, J.A., BSc (Agr.), MSc (McGill), PhD (Cornell)
MacRae, K.B., BEd (BC), MSc, PhD (Oregon)
McAllister, T.A., BSc (Agr.), MSc (Alberta), PhD (Guelph)
Papadopoulos, Y.A., BSc, MSc, PhD (Guelph)
Prange, R.K., BSc (Acadia), MSc (BC), PhD (Guelph)
Privé, J.P., BSc (Winnipeg), MSc, PhD (Guelph)
Rathgeber, B., Bsc (Agr.) (Sask), MSc (Arkansos), PhD (Sask)
Rodd, V. BSc (UPEI), MSc (Manitoba)
Schumann, A.W., BSc, MSc (Univ. of Natal), PhD (Georgia)
Singh, R.P., BSc (Agr), MSc (Agr) (Agra Univ), PhD (N. Dakota)
Sturz, A.V., BSc, PhD (Univ of Manchester)
Warman, P.R., BSc (Agr) (Rutgers), MSc, PhD (Guelph)
Zebarth, B., BSc (Agr), MSc (Guelph), PhD (Sask)

The above NSAC faculty and adjunct professors are members of the Faculty of Graduate Studies, Dalhousie University.

I. Admission

The Nova Scotia Agricultural College has facilities for advanced study and research leading to an MSc in Agriculture.

The Master of Science degree is granted by Dalhousie University in cooperation with the Nova Scotia Agricultural College.

Candidates must satisfy the general requirements for admission to the Faculty of Graduate Studies. All inquiries for admission should be addressed to: The Research & Graduate Studies Office, Nova Scotia Agricultural College, P.O. Box 550, Truro, Nova Scotia B2N 5E3

Please refer to the Admission Dates section for final dates for receipt of application for admission.

A. MSc Degree Program

The Master of Science degree is granted by Dalhousie University in association with the Nova Scotia Agricultural College, the only educational institution in the Atlantic Region with the faculty and facilities capable of providing such a program of study.

Graduate students attend classes at the Nova Scotia Agricultural College and, on occasion, supplement their program with classes at Dalhousie University. Students may choose to concentrate their studies in any of the following areas:
Agribiology: Waste Management, Environmental Microbiology, Ecology, Pest Management, Agricultural Systems, Resource Management
Agricultural Chemistry: Food Science, Agricultural Chemistry
Soil Science: Soil Chemistry, Nutrient Management, Soil Fertility, Soil Conservation, Soil Management
Animal Science: Nutrition, Animal Behaviour, Genetics and Breeding, Animal Product Technology, Physiology, Animal Management, Aquaculture (Shell-Fish & Fin-Fish culture)
Plant Science: Cropping Systems Management, Plant Genetics, Nutrition, Pathology, Physiology, Biotechnology, Horticulture

The MSc in Agriculture program is research centered. All students must complete a research thesis embodying original contribution in the thesis field of study. The thesis is defended at an oral examination.

Students are required to take a minimum of four (4) graduate courses (0.5 credit hours each). The graduate class AGRI 5700.03 Communication Skills and Graduate Seminar is a required class. The remaining three (3) courses are selected by the student in consultation with his or her supervisor.

In addition, students must demonstrate in the laboratory of at least one undergraduate class in order to gain knowledge and experience in classroom instruction, and must be admitted to candidacy within the first four to six months of their program.

II. Class Descriptions

Graduate classes are intended only for students registered in the MSc program and may be taken by undergraduate students only under exceptional circumstances, where they meet normal MSc admission requirements.

Not all classes are offered every year. Please check the current timetable to see whether a particular class is being offered.

AGRI 5210.03: Special Topics in Environmental Microbiology.

This class will allow students to study a particular topic in the field of environmental microbiology in more depth than would be practical in a general class. The student will choose a topic in consultation with the instructor. An in-depth literature search will be required and the material gathered will be discussed in weekly tutorial sessions. Laboratory work will be conducted when required and if appropriate to the topic chosen. Topics for study can be of either a theoretical or applied nature, with the needs of the student being a primary factor in finalizing the topic.
INSTRUCTOR(S): G. Stratton
FORMAT: Lecture 3 hours

AGRI 5220.03: Special Topics in Weed Science.

Topics might include: evolution of weeds, impact of weeds on human history, weed ecology and physiology, crop/weed interactions, herbicide chemistry, physiological and biochemical behavior of herbicides in plants, environmental fate of herbicides, myco-herbicides, biorationals. Two term projects and a research critique will be required.
INSTRUCTOR(S): G. Sampson
FORMAT: Lecture 3 hours

AGRI 5240.03: Special Topics in Environmental Impact.

This class will allow students to study a particular topic in the field of environmental impact or environmental toxicology in more depth than would be practical in a general class. The student will choose a topic for study in consultation with the instructor. An in-depth literature search will be required and the material gathered will be discussed in weekly tutorial sessions. Laboratory work will be conducted when required and if appropriate to the topic chosen. Topics for study should be related to the student's area of research or interests.
INSTRUCTOR(S): G. Stratton
FORMAT: Lecture 3 hours

AGRI 5250.03: Soil Microbiology.

This class is designed to provide an intensive study of the microbiology of soils and will emphasize nutrient cycling and biodegradation. Topics covered include the relationships between the abiotic and biotic components of soils, the microbial biochemistry of the carbon, nitrogen, sulphur, phosphorus, and selected micronutrient cycles, heavy metal cycling, and the microbial degradation of industrial wastes and pesticides. The laboratory classes will concentrate on techniques to monitor the microbial biomass in soil and the microbial components of nutrient cycles. These include new advances in bacterial taxonomy and identification and the use of gas chromatography and high performance liquid chromatography in quantitating nutrient cycling. In addition to a major term paper, a comprehensive laboratory report on the entire term's lab work, and a single take-home examination, graduate students will be required to:
a) modify the term paper into a critical review of some aspect of soil microbiology (chosen in consultation with the instructor); the review must be current and in depth; it must be written in manuscript format and will be graded accordingly,
b) perform additional laboratory exercises not assigned to undergraduate students; use more replicates; perform a full statistical analysis of data; provide a report in manuscript format,
c) give a seminar to the class on their term paper topic.
INSTRUCTOR(S): G. Stratton
FORMAT: Lecture 3 hours, lab 4 hours
CROSS-LISTING: MICR 4000

AGRI 5260.03: Special Topics in Plant Pathology.

This class will be custom-designed to meet the specific needs of graduate students specializing in the area of plant pathology who need further specific knowledge and/or skills.
INSTRUCTOR(S): A.B. Gray, R.P. Singh
FORMAT: Lecture 3 hours

AGRI 5270.03: Economic Entomology.

Insect pest management in agriculture with emphasis on a selection of non-chemical approaches to insect control, e.g. natural, mechanical, physical, cultural, biological, biochemical, and/or legal control. According to student(s) interest, a section on chemical control can be included. This class is consistently in accord with the theory and principles of integrated pest management (IPM) and consequently, the term assignments will incorporate the study of sampling techniques and monitoring methods of insect pests and related beneficial arthropods. Attendance at certain relevant seminars may be required and directed readings may be assigned. A case history of a major agricultural insect pest will be included to satisfy the class requirement. The material will be submitted in term paper format and also delivered in an oral presentation. The case history will include the life cycle, host plants, pest status, damage, losses, control measures, research needs and IPM programs pertinent to the particular species.
INSTRUCTOR(S): TBA
FORMAT: Lecture 2 hours, tutorial 1 hour

AGRI 5310.03: Special Topics in Applied Ethology.

Class content will vary. Topics covered will be chosen so as to meet the requirements of individual graduate students. Aspects could include the assessment of farm animal welfare, foraging behavior, environmental enrichment, social dynamics of livestock, early rearing environment and the effect on later behavior.
INSTRUCTOR(S): T. Tennessen
FORMAT: Lecture 3 hours

AGRI 5320.03: Special Topics in Animal Nutrition.

The class is designed to provide an opportunity to study specific aspects of animal nutrition. Aspects could include study of a particular nutrient, a process in nutrition, a nutritional state, or nutrient metabolism of a specific species with focus on the research method. The student is advised to consult with their supervisor to determine the specific scope of the topic to be studied.
INSTRUCTOR(S): D. Anderson, A. Fredeen, or K. Rouvinen-Watt
FORMAT: Lecture 3 hours

AGRI 5340.03: Special Topics in Animal Physiology.

This class is for students with a major interest in animal physiology. The class will consist of discussions, term papers and presentations. Students will be expected to nominate topics for consideration and to prepare major reviews and class presentations of selected topics.
INSTRUCTOR(S): L. MacLaren, K. Rouvinen-Watt, or J. Duston
FORMAT: Lecture 3 hours

AGRI 5350.03: Animal Research Methods.

This class is designed for students who are, or expect to be, working in Animal Science, or who have an interest in the methodology and ethics of animal research. The class will include consideration of some of the common or promising laboratory and field methods associated with domestic animal research, ethics of animal research, the analysis and interpretation and reporting of results. Students will be expected to participate in exercises, to contribute to discussions, and to present reviews on various aspects.
INSTRUCTOR(S): Dept. of Plant and Animal Sciences Faculty
FORMAT: Lecture 3 hours

AGRI 5360.03: Protein Nutrition.

A study of the sources, availability and metabolism of protein and amino acids for the domestic animal. Subjects addressed include discussion of sources of protein, factors affecting digestibility of protein, digestion and absorption of protein and nitrogen, urea recycling, individual amino acid metabolism, excretion of nitrogenous wastes in birds and mammals, and protein and amino acid requirements of animals.
INSTRUCTOR(S): D. Anderson
FORMAT: Lecture 3 hours

AGRI 5370.03: Special Topics in Animal Breeding and Genetics.

Provides students with an opportunity to pursue more detailed studies in Animal Breeding/Genetics. Topics will be decided on by the student in consultation with faculty members for the purpose of meeting the student's specific needs as defined by the thesis research. Delivery will be a combination of directed reading and tutorial discussions.
INSTRUCTOR(S): Dept. of Plant and Animal Sciences Faculty.
FORMAT: Lecture 3 hours

AGRI 5380.03: Quantitative Genetics.

An introduction to quantitative genetics theory and to statistical techniques used in domestic animal improvement. Computing and statistical techniques will be demonstrated, and presented, and relevant literature will be surveyed. Reference will be made throughout to performance recording programs used in Canada and throughout the world.
INSTRUCTOR(S): D. Patterson
FORMAT: Lecture 3 hours

AGRI 5390.03: Molecular Genetic Analysis of Populations.

This class is designed to give graduate students some understanding of the theoretical aspects of population and molecular genetics. Various DNA fingerprinting techniques, such as minisatellites, microsatellites, RAPD-PCR, RFLP-PCR and SSCP-PCR, and their applications in population genetic studies will be discussed. Students will acquire hands-on experience with some of these techniques. Analysis of molecular data to estimate intrapopulation populations (heterozygosity, Hardy-Weinberg equilibrium) and interpopulation parameters (test of heterogeneity of allele frequency distributions, genetic distances, phylogenetic analysis, bootstrapping, F-statistics) will be covered.
INSTRUCTOR(S): A. Farid
FORMAT: Lecture 3 hours, labs 4 hours

AGRI 5410.03: Special Topics in Soil Fertility.

This class is designed to provide an opportunity to study specific aspects of soil fertility. Topics may include the influence of soil biological, chemical and physical properties and processes on nutrient absorption and plant growth, with emphasis on essential plant nutrients in the soil and methods for evaluation, as well as the use of inorganic and organic amendments.
INSTRUCTOR(S): D. Percival
FORMAT: Lecture 3 hours

AGRI 5430.03: Special Topics in Environmental Analysis.

Students may apply to undertake either a specially designed class in environmental analysis, or to undertake additional work further to Organic Environmental Analysis. This may be facilitated with written consent from the instructor who then assumes personal responsibility for supervising the work.
INSTRUCTOR(S): J. Hoyle
FORMAT: Lecture 3 hours

AGRI 5440.03: Organic Environmental Analysis.

(Next offered in 2009-2010)
This class has limited enrollment. The class will involve the study of the analytical chemical techniques used in the analysis of environmental samples obtained from the atmosphere, hydrosphere, and lithosphere. Included in this study will be the sampling methods used for air, water, soil, food and wastes, and modelling of environmental contamination. In addition, government regulations, hazard assessment and public awareness of these issues will be discussed. In addition to successfully completing examinations graduate students will be required to perform the following tasks:
(a) To write a major paper on an important topical issue.
(b) To present that paper as a seminar before Departmental faculty, staff & students.

(c) To write a research proposal prior to starting the laboratory project.
INSTRUCTOR(S): J. Hoyle
FORMAT: Lecture 3 hours, labs 4 hours

AGRI 5450.03: Environmental Soil Chemistry.

(Next offered in 2008-2009)
This class is designed to provide an opportunity to study specific aspects of environmental soil chemistry. Topics may include the chemical composition of soils with special attention to soil biochemistry and soil organic matter with an emphasis on organic matter-clay interactions, soil organic N, P and S, and soil enzymology. Graduate students will be expected to participate in lecture/discussion sessions and complete required reading assignments. In addition, graduate students will be required to complete research papers and present their findings at in-class seminars.
INSTRUCTOR(S): J. Hoyle
FORMAT: Lecture 3 hours, labs 4 hours
CROSS-LISTING: SOIL 4000
MINIMUM ENROLMENT: 10 or more students

AGRI 5460.03: Special Topics in Soil and Water Management.

This class will discuss state-of-the-art soil and water management practices in either humid or arid regions, depending on the specific needs of the graduate students. Topics may include: fundamentals of soil and water properties; drainage and water table control; management of farm irrigation and drainage systems; salinity control; irrigation water requirements; drainage requirements for humid and arid regions; soil conservation; and computer modelling of irrigation and drainage systems. Guest speakers will be invited to share their experience with students.
INSTRUCTOR(S): R. Gordon, A. Madani, P. Havard
FORMAT: Lecture 3 hours

AGRI 5470.03: Special Topics in Analytical Instrumentations for Researchers.

This class will be designed to meet the needs of graduate students who are using analytical instruments in their research. The class will provide the graduate student with specific theoretical knowledge and the necessary practical skills required to properly use the instruments of interest. The student will select either one of the following areas for a detailed consideration of 2 to 3 of the following areas for a more general coverage: gas chromatography, liquid chromatography, atomic analysis, DNA or protein electrophoresis, infrared or fluorometric analysis, NMR, and mass spectrophotometry, microscopy.
INSTRUCTOR(S): N. Pitts, G. Stratton, J. Hoyle
FORMAT: Lecture 3 hours

AGRI 5510.03: Special Topics in Plant Breeding.

This class will be designed to meet the specific needs of graduate students specializing in the area of Plant Breeding who need further specific knowledge and/or skills.
INSTRUCTOR(S): Dept. of Plant and Animal Sciences Faculty
FORMAT: Lecture 3 hours

AGRI 5520.03: Plant Breeding Methods.

Genetic and statistical principles underlying modern plant breeding methods are introduced. Those principles will be reinforced through the use of computer models. Cultivar development techniques for self-and cross-pollinated species are examined in detail. Applications of tissue culture, genetic engineering, and marker-facilitated selection are discussed. This class is open to students who have had introductory classes in genetics, plant breeding, statistics, and molecular biology.
INSTRUCTOR(S): Dept. of Plant and Animal Sciences Faculty
FORMAT: Lecture 3 hours, labs 2 hours

AGRI 5530.03: Nitrogen in Crop Production.

Students will study the transformations of N in air, soil, water, and plants and consider crop requirements for N. Topics include the chemistry of N, the N cycle, N transformations in soil, N metabolism in plants, N transport in plants, N-fixation, N losses in agricultural systems and an evaluation of N fertilizer in these systems.
INSTRUCTOR(S): H. Li, D.Burton, D.Lynch
FORMAT: Lecture 3 hours

AGRI 5540.03: Special Topics in Crop Physiology.

This class will be designed to meet the specific needs of graduate students specializing in the area of Crop Physiology who need further specific knowledge and/or skills.
INSTRUCTOR(S): C.D. Caldwell, S.K. Asiedu, N. Goodyear, R.C. Martin, R. Lada
FORMAT: Lecture 3 hours

AGRI 5560.03: Advanced Crop Physiology.

(Next Offered in 2009-2010)
Physiological processes relevant to crop plant development and production of harvestable yield will be examined.
INSTRUCTOR(S): C.D. Caldwell
FORMAT: Lecture 3 hours

AGRI 5570.03: Special Topics in Agricultural Biotechnology.

This class will be designed to meet the specific needs of graduate students specializing in the area of Agricultural Biotechnology who need further specific knowledge and/or skills.
INSTRUCTOR(S): L. MacLaren
FORMAT: Lecture 3 hours

AGRI 5610.03: Special Topics in Animal Product Technology.

This class will review areas important in the technology of foods derived from animals (meat, fish, eggs, milk). Such areas could include chemistry (lipid oxidation, Maillard reactions), physics (changes caused by freezing, sol-gel conversion, color) and microbiology (spoilage, pathogenic organisms, modified-atmosphere packaging, HACCP). Each student will be expected to present a review of a particular topic.
INSTRUCTOR(S): Dept. of Plant and Animal Sciences Faculty
FORMAT: Lecture 3 hours

AGRI 5620.03: Ruminant Digestive Physiology & Metabolism.

(Next offered in 2008-2009)
This class is designed to provide an intensive study of food intake and digestion, and nutrient absorption and metabolism, in the ruminant animal. The class details current knowledge and focuses on aspects of future research interest. Students are expected to contribute to discussions and present reviews to the class on various aspects of the subject.
INSTRUCTOR(S): A.H. Fredeen
FORMAT: Lecture 3 hours, lab 2 hours
PREREQUISITE: NUTR 3000, CHEM 3006

AGRI 5630.03: Intermediate Statistical Methods.

Analysis of single-factor experiments, randomized blocks, latin squares, factorial and two-level fractional factorial designs.
INSTRUCTOR(S): T. Astatkie
FORMAT: Lecture 3 hours, lab 1 hour
PREREQUISITE: STAT 3000 or permission of the instructor
CROSS-LISTING: STAT 4000

AGRI 5700.03: Communication Skills and Graduate Seminar.

Through practical assignment students will be able to test and develop their communication skills. Topics will include review, criticism and writing of journal papers, grant applications, posters, seminars, lectures and interviews. This class is required for students enrolled in the MSc in Agriculture Program.
INSTRUCTOR(S): R. Gordon
FORMAT: Lecture 3 hours, Seminar 1 hour

AGRI 5705.03: Graduate Module Class II.

COORDINATOR: C. Caldwell

AGRI 5710.03: Graduate Module Class I.

This class normally consists of three modules. Each module consists of one month of lectures or assignments (2-3 hours per week) dealing with a topic in the lecturer's area of expertise. Research interests of incoming students are taken into account each year when module topics are solicited. Depending on the background of the student selecting the module, the work will be at an introductory graduate level. However, students should not apply to take a module unless they have at least a second year undergraduate background in related material. A formal evaluation is made at the end of each module. This class normally consists of three modules.
COORDINATOR: C. Caldwell

AGRI 5720.03: Applied Statistics & Experimental Design for Agriculture.

This class is designed to provide: (a) practical skills in statistical methods and experimental designs, and (b) an appreciation of situations when more complex models and methods are required. Topics include linear and nonlinear regression, split-plot designs, repeated measures and response surface methods. Students will be expected to successfully complete practical exercises involving real experimental problems and data sets. Students will also be expected to acquire proficiency in at least one advanced statistical software package. This class is recommended for students enrolled in the MSc in Agriculture program.
INSTRUCTOR(S): T. Astatkie
FORMAT: Lecture 3 hours
PREREQUISITE: STAT 4000/AGRI 5630 or equivalent

AGRI 5740.03: Advanced Studies in Food Chemistry.

This class is designed to allow graduate students to explore in detail various aspects of the chemical nature of agri-food products. This may include but is not limited to a study of naturally occurring components (functional foods and nutraceuticals), nutritional changes during value-added processing and product formulation. The exact focus of the class will depend on the expressed interest of student in the class.
INSTRUCTOR(S): N. Pitts
FORMAT: Lecture 1 hour, Discussion 1 hour
PREREQUISITE: One undergraduate food science class or equivalent

AGRI 5750.03: Biotechnology.

(Next offered in January 2010)
The class is to provide students with general information on the theory and technologies that are currently used in biotechnology. Class topics will include gene identification, transformation and expression regulations, tissue culture and cell culture techniques, and other genomics related agricultural applications. Nutriceutical and pharmaceutical applications will also be discussed.
INSTRUCTOR(S): G. Wang-Pruski
FORMAT: Lecture and Lab
PREREQUISITE: Genetics (GENE 2000) or equivalent
CROSS-LISTING: GENE 4003

AGRI 5760.03: Ecology Special Topics.

This course will be designed to meet the specific needs of graduate students specializing in the area of ecology who need further specific knowledge and/or skills.
INSTRUCTOR(S): V. Nams
FORMAT: Lecture/discussion 3 hours
PREREQUISITE: Permission of instructor

AGRI 9000.00: MSc Thesis.

Students register for this class when they are engaged in research work for credit towards the MSc in Agriculture degree.

Anatomy and Neurobiology

Location: Sir Charles Tupper Medical Building,
5850 College St. Halifax, NS B3H 1X5
Telephone: (902) 494-6850
Fax: (902) 494-1212
Website: http://www.anatomy.dal.ca

D.G.J. Campbell Professor and Head of Department

Leslie, R. A.

Professors

Baldridge, W.H., BSc (Toronto), PhD (McMaster), Structure and function of the vertebrate retina (Graduate Studies Coordinator)
Bance, M., BSc, MB, ChB (Manchester), MSc (Toronto), FRCS(C), Anatomy, function and rehabilitation of hearing and balance disorders.
Brownstone, R.M., BSc, MD, PhD (Manitoba), FRCS(C), Spinal cord control of movement, major appointment in Surgery (Neurosurgery)
Currie, R.W., BSA, MSc, PhD (Manitoba), Heat shock proteins and protection of heart and brain
Hopkins, D.A., BSc (Alta), MA, PhD (McMaster), Anatomy and function of the autonomic nervous system chemical neuroanatomy of the brain
Leslie, R.A., BSc (Brock), PhD (Cambridge) Neuroimaging and Neuropharmacology of psychiatric illness
Mendez, I., MD, PhD (Western), FRCS(C), Neural transplantation in the mammalian CNS, major appointment in Surgery (Neurosurgery)
Morris, S., BSc (Victoria), MD (Ottawa), MSc (Toronto), FRCS(C), Anatomy and physiology of surgical skin and muscle flaps, major appointment in Surgery
Neumann, P.E., BA, MD (Brown), Development neurogenetics, pattern formation and experimental neuropathology
Rutherford, J.G., BA (Cornell), MS (Syracuse), PhD (SUNY), History of mental health care in Atlantic Canada
Semba, K., BEd, MA (Tokyo), PhD (Rutgers), Brain mechanisms of sleep and wakefulness
Wassersug, R.J., BSc (Tufts), PhD (Chicago), Metamorphosis and adaptations of anuran larvae

Associate Professors

Allen, G.V., BSc, PhD (Dal), CNS responses to brain injury
Clarke, D., BSc (Acadia), MDCM, PhD (McGill), FRCS(C), Neuronal survival and regeneration following injury in the central nervous system, major appointment in Surgery (Neurosurgery)
Darvesh, S., MD (Dal), PhD (UNB), FRCP (C), Synthetic chemistry of neurogenerative disorders, major appointment in Medicine (Neurology)
Kablar, B., MD, PhD (Zagreb, Pisa), Developmental relationship between skeletal myogenesis, neurogenesis, and osteogenesis
Rafuse, V.F., BSc (Acadia), PhD (Alberta), Neuronal development and regeneration
Schmidt, M., MSc, MD (Toronto), FRCP(C), Pediatric radiology, major appointment in Radiology
Sinha, G., MBBS (Banaras), Student Advisor to medical and graduate students, Faculty of Medicine
Smith, F.M., BSc, MSc, PhD (UBC), Autonomic control of the circulation

Assistant Professors

Awatramani, G., BS (Rochester), PhD (Suny Buffalo), Synaptic mechanisms involved in coding of visual and auditory information
Marsh, D.R., BSc, MSc (Guelph), PhD (Alberta), Inflammation, neuroprotection and autonomic regulation of blood pressure after spinal cord injury
Schmidt, M., MSc, MD (Toronto), Development of imaging techniques for early detection of CNS disease

The Department of Anatomy and Neurobiology provides facilities for advanced study and research in Neuroscience, Histology, Embryology, Cell Biology and Evolutionary Biology. The goals of the graduate program are to provide in-depth research training in a particular aspect of anatomy, neurobiology or a related field, and to introduce the student to methods of teaching anatomy.

I. Admission Requirements

All general requirements for admission to the Faculty of Graduate Studies must be fulfilled. In addition, applicants are expected to have received a sound training in biology and chemistry.

A. Honours Degree Holders in Biology

Applicants with an excellent background and an A- or better average should apply for direct admission to the PhD program. Others may apply for the MSc program, with option to transfer to the PhD program after one year, contingent upon the recommendation of the student's advisory committee.

B. Master's Degree Holders in a Biological Science

May apply for direct admission to PhD program.

C. Medical Graduates

Individuals showing an aptitude for research may apply for admission to either the MSc or PhD program.

II. Degree Programs

A. Doctor of Philosophy (PhD)

Residency requirements for the PhD degree are summarized in the Faculty of Graduate Studies regulations.

The class requirements for each PhD candidate are decided through consultation with the student, the research supervisor and the student's Advisory Committee at the beginning of the first year. Students must fulfill a minimum of one credit of required classes if they have not taken core classes in anatomical sciences. Students should maintain an A-average. All PhD candidates must participate in the departmental seminar program during each full year of training. The acquisition of teaching skills is an integral part of the program. Therefore, the student is also required to assist in laboratory teaching (approximately 30-40 hours per year) and to deliver 2-4 hours of lectures during the course of his/her training.

A written thesis (ANAT 9530.00) based on original research of a high calibre must be submitted and defended orally.

Financial assistance may be available for qualified candidates for a period of up to four years.

Evaluation

Students must submit a research proposal to their Advisory Committee by the end of the first year.

All PhD candidates must pass a preliminary examination no later than 1 full year prior to the submission of a thesis. The examination will include material related to the general and specific areas of research. The examining committee will be selected by the student's Advisory Committee after consultation with the research supervisor and will conduct the examination in accordance with the regulations established by the Department of Anatomy and Neurobiology.

Thesis Examination

MSc and PhD theses will be defended in accordance with the regulations of the Faculty of Graduate Studies.

B. Master of Science (MSc)

A minimum of two years is required to complete all requirements for the MSc degree.

A minimum of five graduate-level credits are required which includes two credits for required classes. A written thesis reporting original research must be submitted and defended orally. The MSc thesis (ANAT 9000.00) may count for up to three of the five graduate level credits required for the degree. All MSc candidates must participate in the departmental seminar program during each year of training. Classes are decided through consultation with the student, research supervisor and the student's Advisory Committee at the beginning of the first year. For each candidate, classes will be selected from those listed below or, where appropriate, from those offered by other Departments.

The acquisition of teaching skills is an integral part of the program. Therefore, all MSc candidates must assist in laboratory teaching or an equivalent (approximately 30-40 hours) after the first year.

Financial assistance may be available for qualified students for a period of up to two years.

C. Doctor of Philosophy, Anatomy/Neuroscience (PhD)

Anatomy and Neurobiology also offers a PhD in Anatomy/Neuroscience through the interdisciplinary Neuroscience program.

III. Class Descriptions

Required

ANAT 5030X/Y.06: Human Histology.

The class consists of a series of lectures and laboratories describing the structure of the tissues and organs of the human body. The lecture and the laboratory work is supplemented with tutorials.
COORDINATOR: P. Neumann
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will only be given if both are completed consecutively.

ANAT 5100.06: Human Neuroanatomy.

This class is designed to acquaint the student with the anatomy and organization of the human central nervous system. Lectures dealing with cellular morphology; gross and microscopic anatomy of the spinal cord, brain stem, diencephalon (thalamus, hypothalamus, etc.), and telencephalon (cerebral hemispheres); blood supply of the CNS, meninges, and cerebrospinal fluid are presented. Laboratory exercises involve exposure to aspects of microscopic and ultrastructural morphology of the CNS, examination of selected cross sections of spinal cord, brain stem, and diecephalon and telencephalon, and dissection of the brain. In addition, students participate in a series of discussion sessions held once every week. Outside readings on selected topics are assigned, and form the basis for the subjects considered in these sessions. Students take written and practical examinations, give presentations and are expected to submit a term paper on a topic agreed upon in consultation with the instructor.
COORDINATOR: K. Semba

ANAT 5130X/Y.06: Topics in Mammalian Embryology and Molecular Developmental Biology.

The course will cover various topics in general embryology, histology and molecular developmental biology. Students will learn how and why genetically engineered mice are generated. They will become familiar with different phenotypic analyses of mice and mouse embryos that are used as models of human diseases.
COORDINATOR: B. Kablar
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
FORMAT: Lectures, teaching labs, reading assignments, research labs, tutorials
PREREQUISITE: ANAT 5162.03 or consent of the coordinator

ANAT 5162.03: Gross Anatomy of the Head and Neck.

A detailed study of the gross anatomy of the head and neck.
INSTRUCTOR(S): Sinha, G.
FORMAT: Lectures, labs and tutorials
PREREQUISITE: Undergraduate Degree
EXCLUSION: ANAT 5160.09

ANAT 5200X/Y.06: Research Laboratory Techniques in Anatomy and Neurobiology.

(Limited to Anatomy and Neurobiology students)
This class is designed to acquaint students with the theoretical and practical aspects of research techniques in Anatomy and Neurobiology. Lecture and laboratory sessions will be provided by a variety of Faculty members. Participation in this class is required of and restricted to first year Anatomy and Neurobiology graduate MSc students. Students will be expected to spend 2-3 months in another Laboratory to perform research that complements their thesis research. Students will be evaluated on their participation and written critiques of research techniques used in relevant manuscripts by the respective Faculty members.
COORDINATOR: D. Marsh
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

ANAT 5555.03: Embodying the Body: The Human Body for Anatomists and Humanists.

This course explores form and function of the human body and how these relate to broader issues associated with what it means to be human. The course begins with an anatomical exploration of the body, then expands into contemporary issues about the body and embodiment, including gender identity, beauty, etc.
INSTRUCTOR(S): Wassersug, R.
FORMAT: Lecture/discussion/labs
CROSS-LISTING: SOSA 4211

Electives

Students can also elect to take any of the following classes or those offered by other departments.

ANAT 5063.03: Neurobiology of the Autonomic Nervous System.

This class is intended as an overview of classical concepts of the function of the peripheral autonomic nervous system and re-evaluation of these concepts in the light of recent research on the roles of autonomic neurons in control of specific end-organs. The main issues addressed are the importance of peripheral autonomic neurons to the maintenance of homeostasis, and the integrative processes of which these neurons are capable. The target students are those with a general interest in autonomic neurobiology or whose thesis topics cover aspects of organ function with an autonomic component. The content of this class was selected to complement that of other graduate classes dealing with the autonomic nervous system.
COORDINATOR: F. Smith

ANAT 5070.03: Chemical Neuroanatomy.

The goal of this class is to acquaint the student with neurotransmitters and neuromodulators, including excitatory amino acids, acetylcholine, monoamines, neuropeptides. Anatomical, biochemical, physiological, pharmacological, behavioral, and clinical aspects of individual neurotransmitter systems will be discussed. Students are expected to write an examination and a review, and give a presentation. Lectures are given by the instructors.
COORDINATOR: K. Semba, M. Wilkinson
CROSS-LISTING: NESC 5070.03, PHYL 5494.03, NESC/PSYO 4070.03

ANAT 5170.03: Special Topics.

This is a flexible class permitting a student to work closely with one or several faculty members; the content of the class is determined by the individual student in consultation with the faculty member involved and is intended to enable students to take advantage of specialized educational opportunities that fall outside the normal class offerings of the Department. A description and justification of class content must be prepared and approved by the student's Advisory Committee and the Department Graduate Studies Committee.
COORDINATOR: Arranged according to research topic

ANAT 9000.00: MSc Thesis.

ANAT 9530.00: PhD Thesis.

Architecture

Location: Ralph M. Medjuck Building
5410 Spring Garden Road
Halifax, NS B3J 1E7
Mail: School of Architecture
Dalhousie University
P.O. Box 1000
Halifax, NS B3J 2X4
Telephone: (902) 494-3973
Fax: (902) 423-6672
Email: arch@dal.ca
Website: archplan.dal.ca

Director, School of Architecture

Galvin, T., BEDS, MArch (TUNS), MArch (McGill), PhD (Penn)
Telephone: (902) 494-3903
Email: grad.arch@dal.ca

Undergraduate Secretary, School of Architecture

Morash-Kent, S., BA, BEd, MEd (SMU)
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Graduate Secretary, School of Architecture

Nightingale, B., Sec.Dip. (CTT)
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Director of Career and Community Services, Architecture and Planning

Costello, P., BEDS, BArch (TUNS), NSAA
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Email: paula.costello@dal.ca

Graduate Coordinator, School of Architecture

Parcell, S., BArch (Toronto), MArch (Cranbrook), PhD (McGill)
Telephone: 494-3908
Email: stephen.parcell@dal.ca

Professors Emeriti

Baniassad, E., BArch (Illinois), MA, PhD (Manchester), FRAIC
Jackson, A., DiplArch (Poly London), ARIBA

Professors

Cavanagh, E., BSc, BArch (McGill), PhD (Lehigh). Coastal planning, material culture, and history of technology, focusing on change in small communities, vernacular building and construction methods, and architectural design.

Kroeker, R., BES (Manitoba), AADipl, ARCUK. Sustainable building strategies, community architecture; cultural continuity and invention, innovative construction in green wood, recycled materials, and earth formed structures.

MacKay-Lyons, B., BEDS, BArch (TUNS), MArchUD (UCLA), FRAIC, (Hon.) FAIA, NSAA, AAPEI, OAA. Private practice design work in private homes, urban design, public buildings, and artificial intelligence software design.

Macy, C., BA(Arch) (Calif.at Berkeley), MArch (MIT), Reg.Arch.WA. Modern architectural history and criticism, representation of cultural identity in architecture, public spaces, civic infrastructure, temporary urbanism, festival architecture and lightweight structures, architectural history and criticism.

Mannell, S., BES, BArch (Waterloo), NSAA, OAA. Building construction, professional practice; the architecture of public works, post-war modern architecture, contemporary architectural criticism.

Wanzel, J.G., BArch, MArch (Toronto). Human condition and the role of architecture in improving quality of life; especially the history, design and development of decent and affordable housing; housing policy as an instrument of social and economic development.

Associate Professors

Bonnemaison, S., BSc (Concordia), BArch (Pratt), MSc(Arch) (MIT), PhD (UBC). Lightweight and tensile structures, motion studies in architecture, architectural installations, temporary urbanism of festivals, European and American architectural history and theory from 18th to 20th century.

Galvin, T., BEDS, MArch (FP) (TUNS), MArch (McGill), PhD (Penn). Theories of architecture and landscape from the 18th to 20th century, study of human settlements with an emphasis on urban design, international development, and appropriate technologies in developing countries.

Lilley, B., BES (Manitoba), AA Dipl. Ecological and programmatic strategies in design, technical implementation as architectural device, material research in glass, assemblies, and natural ventilation, modernism and aesthetics; computer simulations and cinematic representations.

Molesky, S., BArch (Cal. Poly.), MArch (Cranbrook). Material process and creative imagination, phenomenological and psychological inhabitation, the relationship between body-architecture-landscape, places of memory, natural forms and systems.

Parcell, S., BArch (Toronto), MArch (Cranbrook), PhD (McGill). Historical definitions of architecture; interdisciplinary alliances with architecture; history and theory of architectural representation.

Sassenroth, P., Dipl. Ing. (TU Berlin) Reg.Architekt NRW, Professor in Germany. Design and building construction, sustainable building technologies, rammed earth construction and naturally lit long span construction. Public buildings, urban densification, sustainable urban design, construction and building analysis.

Assistant Professors

Mullin, R., BEDS, MArch (FP) (TUNS). Material detailing, composite materials, means and methods in design and building, representation in documentation, design, and construction.

Parsons, A., BSc (McGill), MES (Dal), SMBT (MIT). Wood technology, wood lot management, wood processing, wood construction; environmental impact of forest management practices, building performance of residential wood frame construction systems.

Savage, N., BA (Alberta), BEDS, MArch (FP) (TUNS), NSAA. Private practice design work in residential buildings, public buildings, and affordable housing developments; architectural visualization and its graphic applications; building case studies.

Somerville Venart, C., Cert. Eng. (Mt. Allison), BFA (Toronto), MArch (SCI-Arc), AK NWF (Germany). Documentation, representation and analysis of the perceptual and spatial in architecture and the urban environment; private design practice: architectural, exhibition, interior, landscape, public space, urban, and graphic design.

Lecturers

Henry, P., BEDS, BArch (TUNS), NSAA. Private practice design work in private homes and gardens, focusing on environmentally benign strategies.

Kelly, P., BSc (Dal), MSc (TUNS). The use of multimedia tools in architectural design, geographical information system, and astroarchaeology (astronomical alignments of ancient structures).

Sweetapple, T., BEDS, MArch (FP) (TUNS), NSAA. Private practice design work in private homes, public buildings, and urban design.

Cross-Appointed Faculty

Palermo, F., BArch (Toronto), MArch UD (Harvard) - Planning

Adjunct Professors

Butler, T., MEng (Leeds), MSt (Cambridge), MCIBSE, MICE, CEng, MBIFM

Chi, L., BArch (Carleton), MPhil (Cambridge), PhD (McGill); Cornell University

Lynch, P., BArch (Cooper Union)

Rousseau, J., BArch (Montreal)

Subotincic, N., BArch (Carleton), MArch (McGill); University of Manitoba
Van Duzer, L., BA(Arch), MArch (Calif. at Berkeley); University of Minnesota

I. Introduction

The School of Architecture, which is part of the Faculty of Architecture and Planning at Dalhousie University, was established in 1961 to serve the Atlantic region. While it continues to fulfil its original mandate, the School also contributes nationally and internationally to architecture. Its primary aim is to educate individuals who intend to become a professional architect. The School's professional degree program includes the two-year Bachelor of Environmental Design Studies degree and the two-year Master of Architecture degree. Most of the program is conducted within the School of Architecture by full-time faculty members. It also includes co-op work terms in which students gain practical experience in an architectural office.

Design

The central activity of the professional degree program is architectural design - the creative study of buildings and cities. In the School's design studios, students examine historical and contemporary buildings in Canada and abroad, and respond through the design of new architectural projects. From the core studies of the undergraduate program to the elective studies and design thesis of the graduate program, students learn to rely on their artistic skill, their knowledge of history and technology, their social and cultural awareness, and their critical imagination. Architecture is a multi-disciplinary profession, with alliances to the fine arts, the humanities and technologies, and many undergraduate disciplines provide an effective entry into architecture. Conversely, architectural studies provide an excellent foundation for careers in a variety of design-related fields.

Facilities

The School is housed in the original home of the Nova Scotia Technical College, built in 1909 and renamed the Ralph M. Medjuck Building in 2005. Corresponding to the School's emphasis on architectural design, one-third of the building is devoted to studio spaces that are open to students twenty-four hours a day. The building also has several computer labs with a wide array of equipment, a fully-equipped woodworking shop, an experimental construction lab, a digital modeling shop, photographic facilities, and a large exhibition hall. The University Library's architecture collection is located nearby.

Co-op Work Terms

The School's professional degree program includes two work terms that provide students with practical experience in building design and responsible professional practice. The School's Co-op Program has been operating since 1970, and the Faculty of Architecture and Planning's Co-op Office assists students in finding suitable work term placements. In recent years, Architecture students have been employed in every province and territory in Canada, and approximately one-third have chosen to work abroad - in Antigua, Australia, Barbados, Bermuda, Botswana, China, Czech Republic, Egypt, England, France, The Gambia, Germany, Guatemala, Hong Kong, India, Iran, Ireland, Italy, Kuwait, Morocco, Netherlands, New Zealand, Nicaragua, Norway, Peru, Portugal, Scotland, Sierra Leone, Singapore, South Africa, South Korea, Switzerland, Taiwan, Trinidad and Tobago, Turkey, Turks and Caicos, and the United States.

Accreditation

The School's professional degree program is fully accredited by the Canadian Architectural Certification Board. The entire six-year program consists of two years of general studies at a recognised university, followed by two years of undergraduate study at the School of Architecture (BEDS) and two years of graduate study at the School of Architecture (MArch).

In Canada, all provincial associations recommend a degree from an accredited professional degree program as a prerequisite for licensure. The Canadian Architectural Certification Board (CACB), which is the sole agency authorized to accredit Canadian professional degree programs in architecture, recognises two types of accredited degrees: the Bachelor of Architecture and the Master of Architecture. A program may be granted a five-year, three-year, or two-year term of accreditation, depending on its degree of conformance with established educational standards. Master's degree programs may consist of a pre-professional undergraduate degree and a professional graduate degree, which, when earned sequentially, comprise an accredited professional education. However, the pre-professional degree is not, by itself, recognised as an accredited degree.

Professional Registration

After receiving the professional degree, a graduate may fulfil additional requirements for professional registration, including a period of post-graduate practical experience and the completion of registration examinations. In Canada, these additional requirements are determined by provincial organizations that are empowered to register an individual for professional practice. Reciprocal registration in Canada and the United States is facilitated by the standard Architectural Registration Examination (ARE) that is used in both countries. An American citizen who graduates from the School's MArch program is qualified to become an architectural intern in the United States and to complete the examination for professional registration there. Applicants from other countries are advised to contact their national architectural organization about requirements for professional registration.

II. Classes Open to Non-Majors

The School of Architecture offers several classes that are open to all students in the university:

- ARCH 1000X/Y.06: Introduction to Architecture
- ARCH 1200X/Y.06: Science of the Built Environment
- ARCH 2000.03: Visual Thinking A
- ARCH 2001.03: Visual Thinking B
- ARCH 2025.03: Design Drawing

Please consult the university's academic timetable for available classes. Individuals who are not currently registered at Dalhousie University should refer to the university's regulations in this calendar for details on Special Student status.

III. Undergraduate Degree Program

The Bachelor of Environmental Design Studies program description is included here in the graduate calendar to provide an overview of the entire professional degree program in the School of Architecture, which includes both the BEDS and the MArch degrees. Please refer to the undergraduate calendar for undergraduate regulations.

Bachelor of Environmental Design Studies

BEDS is a two-year, full-time, pre-professional program for a student who has already completed at least two years of general studies in subjects other than architecture. It consists of four academic terms in residence and a four-month work term. The BEDS degree recognises a student's successful completion of a minimum of four years of university study, including two at the School of Architecture.

The BEDS program consists primarily of required classes in Design, Humanities, Technology, Representation, and Professional Practice. These classes provide a base of academic knowledge and design skill from which a student may proceed to a graduate program. The BEDS program leads to the MArch program, as well as to the Faculty's other graduate programs in Environmental Design Studies and Planning. A BEDS graduate may also choose to continue into another related field in design, environmental studies, management, etc., at Dalhousie or elsewhere.

For Undergraduate admission requirements, see the undergraduate calendar or the School of Architecture website: archplan.dal.ca.

IV. Undergraduate Classes Offered

A. Professional Degree Program

The following chart illustrates the distribution of terms throughout the four years of the professional degree program in the School of Architecture. Following the two-year general studies prerequisite, the next two years are Bachelor of Environmental Design Studies and the final two years are Master of Architecture.

Fall	Winter	Summer
Year 3 - BEDS B1 (academic term)	B2 (academic term)	**Year 4 - BEDS** B3 (academic term)
B4 (work term)	B5 (academic term)	**Year 5 - MArch** M1 (academic term)
M2 (academic term)	M3 (work term)	M4 (work term)
Year 6 - MArch M5 (academic term)	M6 (academic term)	

B. Bachelor of Environmental Design Studies

Year 3 - Term B1 (Fall)

- ARCH 3001.06: Design
- ARCH 3104.03: Foundations in Architectural History and Theory
- ARCH 3207.03: Building Technology
- ARCH 3301.01: Professional Practice
- ARCH 3501.03: Representation

Year 3 - Term B2 (Winter)

- ARCH 3002.06: Design
- ARCH 3105.03: Architectural History and Theory - 20th Century
- ARCH 3208.03: Building Technology
- ARCH 3302.01: Professional Practice
- ARCH 3502.03: Representation

Year 4 - Term B3 (Summer)

- ARCH 4003.03: Design
- ARCH 4004.03: Free Lab
- ARCH 4110.03: Architectural History and Theory - 14th-18th Century
- ARCH 4211.03: Building Systems Integration
- ARCH 4303.01: Professional Practice
- ARCH 4501.03: Representation

Year 4 - Term B4 (Fall)

- ARCH 8892.03: Professional Practice (Co-op Work term)

Year 4 - Term B5 (Winter)

- ARCH 4005.06: Design
- ARCH 4111.03: Architectural History and Theory - 19th Century
- ARCH 4212.03: Building Systems Integration
- ARCH 4304.01: Professional Practice
- ARCH 4502.03: Representation

V. Undergraduate Class Descriptions

First year and second year classes are open to all students in the university. Third-year and fourth-year classes are restricted to students in the BEDS program.

ARCH 1000X/Y.06: Introduction to Architecture.

This class introduces architectural theory and practice through enduring themes in the discipline. It emphasizes design as a method of study, considers the materiality of buildings, and interprets the built environment as an expression of culture.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): P. Henry
FORMAT: Lecture/seminar

ARCH 1200X/Y.06: Science of the Built Environment.

This class introduces a broad range of scientific principles that influence the construction and environment of buildings. It studies topics such as mechanics, ecology, light, heat, and sound. The class uses a "common-sense" approach involving graphic images, practical understanding, and problem-solving; a background in science or mathematics is not required.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): D. Pitcairn
FORMAT: Lecture

ARCH 2000.03: Visual Thinking A.

Architects, scientists, political activists, manufacturers, and others employ a variety of visual tools to study and engage with the world. Students in this course learn to evaluate maps, simple technical drawings, and other visual devices, and use them to analyze actual situations and to generate and present innovations. Hands-on work is emphasized, but no prior experience in drawing or design is needed. With its focus on conceptualizing the concrete, outer world, this course is a useful complement to ARCH 2001.03.
INSTRUCTOR(S): E. Jannasch
FORMAT: Lecture/seminar
PREREQUISITE: Completion of first year university or permission of instructor

ARCH 2001.03: Visual Thinking B.

As the world becomes more visually oriented, a critical appreciation of visual information becomes indispensable. Students use charts, diagrams and other means of externalizing, developing, and sharing ideas. In doing so, they learn to analyze the form of graphic information as well as the content. Hands-on work is emphasized, but no prior experience in drawing or design is needed. This course is a more abstract and reflective complement to ARCH 2000.03.
INSTRUCTOR(S): E. Jannasch
FORMAT: Lecture/seminar
PREREQUISITE: Completion of ARCH 2000.03 or permission of instructor

ARCH 2025.03: Design Drawing.

This class enables students to enhance their design literacy skills through attention to graphic design, layout, composition, and typography. Students will gain experience in a range of techniques in design drawing and portfolio presentation.
FORMAT: Lecture/lab
PREREQUISITE: ARCH 1000, PLAN 1002 or permission of instructor
CROSS-LISTING: PLAN 2025.03

ARCH 3001.06: Design.

This class studies basic principles of architecture through studio projects using drawings and models. Students design elementary building forms beginning with the room and the pavilion, on various sites. Working with basic building elements of floor, wall and roof, students consider architectural composition and materials at the three scales of detail, building, and site. The class includes historical design studies to understand how other architects have responded to similar problems.
INSTRUCTOR(S): Staff
FORMAT: Lecture/studio
RESTRICTION: Year 3 BEDS students

ARCH 3002.06: Design.

This class studies principles of architecture by focusing on the design of the house. Building on topics from ARCH 3001, it considers issues of composition (structural, volumetric, and spatial), building program, interior environment, and relations to community context and ecological surroundings. The class includes historical design studies to understand how other architects have responded to these issues.
INSTRUCTOR(S): Staff
FORMAT: Lecture/studio
RESTRICTION: Year 3 BEDS students

ARCH 3104.03: Foundations in Architectural History and Theory.

This class introduces basic topics in architecture and interpretive methods in architectural research. It focuses on selected buildings and the role of the architect in the ancient and medieval eras. To develop research skills and architectural awareness, students interpret local buildings through direct experience and study distant and historical buildings through publications.
INSTRUCTOR(S): S. Parcell
FORMAT: Lecture/seminar
RESTRICTION: Year 3 BEDS students

ARCH 3105.03: Architectural History and Theory - 20th Century.

This class is a survey of late modern architecture, focusing on Europe and North America. Buildings and urban projects are situated in their social and political contexts and the theoretical constructs that influenced their development. Students are exposed to extramural archives and resources to research local modern buildings and their architects.
INSTRUCTOR(S): C. Macy
FORMAT: Lecture/seminar
RESTRICTION: Year 3 BEDS students

ARCH 3207.03: Building Technology.

This class studies aspects of building technology that act as primary generators of architectural form: structure, material, light and sound. Construction process is examined in terms of materials, methods and sequences. Principles of building structure and methods of structural analysis are introduced. The physics and perception of light and sound in built environments are studied. Quizzes and tests are complemented by studio exercises.
INSTRUCTOR(S): Staff
FORMAT: Lecture/studio
RESTRICTION: Year 3 BEDS Students

ARCH 3208.03: Building Technology.

This class studies aspects of building technology that mediate the relationship between interior and exterior environments. Building materials studies include structural and environmental properties, constructional implications, and principles of assembly and jointing. The principles of heat flow, air flow and moisture flow in building enclosures are presented. Students undertake a series of design exercises applying knowledge of topics studied in the class.
INSTRUCTOR(S): P. Sassenroth
FORMAT: Lecture/studio
RESTRICTION: Year 3 BEDS students

ARCH 3301.01: Professional Practice.

This class introduces the role and place of the architect in society with an emphasis on the development of the profession through history. The class includes a parallel study of the development of methods of representation employed in architectural practice, from stone tablets to digital modeling.
INSTRUCTOR(S): N. Savage
FORMAT: Lecture/seminar
RESTRICTION: Year 3 BEDS students

ARCH 3302.01: Professional Practice.

In this week-long module students learn about the architect in society; the political, social, economic and ethical environments in which architects practice; and an introduction to office organization and project management.
INSTRUCTOR(S): Staff
FORMAT: Lecture/seminar
RESTRICTION: Year 3 BEDS students

ARCH 3501.03: Representation.

This class studies basic principles of drawing, modeling, imaging, and composition. Students use manual media and photography to describe sites and designs. Topics include sketching, measurement and scale, orthographic and axonometric drafting, and image framing. Drafting and modeling equipment is required.
INSTRUCTOR(S): C. Venart
FORMAT: Lecture/studio
RESTRICTION: Year 3 BEDS students

ARCH 3502.03: Representation.

This class builds on the principles of drawing, modeling, imaging, and composition studied in ARCH 3501. It emphasizes manual skills and concepts of 2D and 3D interplay in drawing, imaging, and materials. Topics include constructiveness, sketching, phenomenology, and tactility.
INSTRUCTOR(S): S. Molesky
FORMAT: Lecture/studio
RESTRICTION: Year 3 BEDS students

ARCH 4003.03: Design.

This class studies principles of architecture through the design of a public building. Building on previous courses, it includes the organization of a public program and issues of context and interpretation. As an intensive studio it encourages students to focus on design intentions and to develop an awareness of design process.
INSTRUCTOR(S): Staff
FORMAT: Lecture/studio
RESTRICTION: Year 4 BEDS students

ARCH 4004.03: Free Lab.

To complement studio-based learning, this class is an experimental hands-on workshop in design led by an instructor. Investigations of a particular architectural topic may include design-and-build, documentary work, landscape installations, community design projects and interdisciplinary work. Projects may be done locally or involve travel to a distant site.
INSTRUCTOR(S): Staff
FORMAT: Lecture/studio
RESTRICTION: Year 4 BEDS students

ARCH 4005.06: Design.

This class studies advanced principles of architectural design through the design of a medium-sized institutional building. Elaborating on topics from the previous design courses, students organize a complex program on an urban site and develop a project that uses building technology strategically and engages relevant issues in architectural history and theory. Emphasis is also placed on fluency in architectural representation.
INSTRUCTOR(S): Staff
FORMAT: Lecture/studio
RESTRICTION: Year 4 BEDS students

ARCH 4110.03: Architectural History and Theory - 14th-18th Century.

This class studies significant buildings and the role of architecture from the Renaissance to the Enlightenment, mainly in Europe. It follows the transition from master builder to architect, and the humanist search for order and its manifestation in built form. Students analyze the design of significant buildings by studying historical documents and making interpretive drawings and models.
INSTRUCTOR(S): T. Galvin
FORMAT: Lecture/seminar
RESTRICTION: Year 4 BEDS students

ARCH 4111.03: Architectural History and Theory - 19th Century.

This class studies significant buildings and architects in Europe and North America during the early modern era. It focuses on buildings related to influential theories or developments in material culture and technology. To develop skills in research and criticism, students examine primary and secondary sources, including articles, photographs, and drawings.
INSTRUCTOR(S): Staff
FORMAT: Lecture/seminar
RESTRICTION: Year 4 BEDS students

ARCH 4211.03: Building Systems Integration.

This class studies the integration of building structural and enclosure systems in architectural design. Long span structural systems and lateral forces are examined, including their interaction with the enclosure system. Building enclosure studies include the performance of materials in assemblies, the performance of the building envelope, and the sequence of construction. The integration of structure and enclosure is examined through the construction detail. Students complete case studies and design projects integrating structure and enclosure in buildings.
INSTRUCTOR(S): S. Mannell
FORMAT: Lecture/studio
RESTRICTION: Year 4 BEDS students

ARCH 4212.03: Building Systems Integration.

This class studies performance standards related to human activities in buildings, and the systems and configurations required to support those activities. Building systems are considered in relation to climate, urban situation, and the natural environment. Principles of systems thinking, as

well as the use of physical and computational modeling methods, are applied to the comprehensive design of a building to achieve defined performance standards and to consider issues of sustainability with regard to energy balance, water conservation, and component materials.
INSTRUCTOR(S): R. Kroeker
FORMAT: Lecture/studio
RESTRICTION: Year 4 BEDS students

ARCH 4303.01: Professional Practice.

This class introduces contemporary office practices and project delivery including marketing, contracts, project phases and contract administration. The class also introduces issues related to the co-op workterm including job placement and the role of the student in a professional office.
INSTRUCTOR(S): Staff
FORMAT: Lecture/seminar
RESTRICTION: Year 4 BEDS students

ARCH 4304.01: Professional Practice.

In this week-long module students learn about the architect in society; professional ethics; models of practice; legal aspects of practice; authorities having jurisdiction over building; finance and costing techniques; and internship.
INSTRUCTOR(S): Staff
FORMAT: Lecture/seminar
RESTRICTION: Year 4 BEDS students

ARCH 4501.03: Representation.

This class builds on the previous Representation courses. It studies the expressive use of manual and digital media to present design work to various audiences, including the architectural community and the public. Topics include image editing, rendering, and the integration of text, image, and model. Design work may be presented in an exhibition installation, printed book, and/or online portfolio.
INSTRUCTOR(S): R. Mullin
FORMAT: Lecture/studio
RESTRICTION: Year 4 BEDS students

ARCH 4502.03: Representation.

This class studies advanced strategies of representation. It promotes the fluent use of manual and digital media in design development, guided by architectural intentions and an understanding of architectural history, theory, and technology.
INSTRUCTOR(S): S. Parcell
FORMAT: Lecture/studio
RESTRICTION: Year 4 BEDS students

ARCH 8892.03: Professional Practice (Co-op Workterm).

A student works in some aspect of the profession for a total of 500 hours to be accomplished in no less than 12 weeks, and completes a research report or assignment. Work placements are coordinated by the co-op coordinator for Architecture and must be approved by the School. In exceptional circumstances a student may apply to satisfy up to 500 hours of the time requirement through supervised research related to professional practice.
RESTRICTION: Year 4 BEDS students

VI. Graduate Degree Programs

A. Master of Architecture

Master of Architecture is a two-year, full-time program consisting of four academic terms in residence and an eight-month work term. It includes required classes that complete the core requirements for the School's professional degree program. Elective classes also enable a student to focus on a particular area of study such as housing, urban design, history and theory, building technology, environmental design, or computer applications. In the final year each student works on a design thesis, supervised by a faculty member.

The MArch program begins in May. Most transfer students enter in January to take qualifying classes during the winter term.

B. Master of Architecture (Post-Professional)

Master of Architecture (Post-Prof.) is a one-year program for a student who has already obtained a professional degree in architecture. It may be taken through full-time or part-time study. Subject areas each year depend on faculty availability. For available subjects in 2008-2009, please refer to the "Graduate Programs" page on the School of Architecture Website.

Two options are available for completing the MArch (Post-Prof.) program:
1. Eight half-credits of classes plus a MArch (Post-Prof.) Major Project equivalent to two half-credits.
2. Six half-credits of classes plus a MArch (Post-Prof.) Thesis equivalent to four half-credits.

C. Master of Environmental Design Studies

Master of Environmental Design Studies is a one-year, non-professional program for a student who has completed an undergraduate degree in environmental design or a related field but does not intend to become a professional architect. It may be taken through full-time or part-time study. Subject areas each year depend on faculty availability. For available subjects in 2008-2009, please refer to the "Graduate Programs" page on the School of Architecture Website.

Two options are available for completing the MEDS program:
1. Eight half-credits of classes plus a MEDS Major Project equivalent to two half-credits.
2. Six half-credits of classes plus a MEDS Thesis equivalent to four half-credits.

VII.Graduate Admission Requirements

A. Minimum Academic Requirements

Candidates for all graduate programs must meet the minimum admission requirements of the Faculty of Graduate Studies.

Master of Architecture

Admission is based mainly on the applicant's design portfolio and academic record. For an applicant to be considered, a minimum of 4 years (eight academic terms) of university classes is required, including architectural studies equivalent to the Dalhousie BEDS degree, with a minimum B average (3.00 GPA) during the last two years (ten credits). A minimum B average in architectural design classes is also required. In assessing an application, the Admissions Committee looks for strong evidence of readiness to pursue graduate studies in design, humanities, technology, and professional practice. For external applicants, the committee looks for strengths equivalent to standards at the end of Dalhousie's BEDS program.

The Admissions Committee assesses transfer credits and recommends the level at which an applicant is eligible to enter the professional degree program. To meet professional accreditation standards, the committee cannot offer a level of entry that would permit a student to obtain the professional degree with less than six full years of university, including two years of general studies. An applicant who is ineligible for Master of Architecture admission may be offered entry at an advanced level in the BEDS program or may be required to take qualifying courses.

Master of Architecture (Post-Professional)

An applicant must have a professional degree in architecture with high academic standing from a recognised university. Admission is based on the applicant's design portfolio, academic record and statement of intent, regarding one of the graduate positions announced on the School of Architecture Website. An application that does not specify an available position will not be accepted.

Master of Environmental Design Studies

An applicant must have an undergraduate degree with high academic standing from a recognised university. This degree must be either a Bachelor of Environmental Design Studies degree, a Bachelor's degree with honours, or a Bachelor's degree with a major in a subject related to the applicant's proposed field of study in the MEDS program. Admission is based on the applicant's academic record and statement of intent, regarding one of the graduate positions announced on the School of Architecture Website. An application that does not specify an available position will not be accepted.

B. Documents

An external applicant to one of the School's graduate degree programs must submit all of the following documents before the application can be reviewed:

1. **To be submitted to the Registrar's Office:**
   Admissions, Registrar's Office
   Dalhousie University
   Halifax, NS
   B3H 4H6
- graduate application form (Part A - copy 1);
- the appropriate application fee (see Graduate Studies Fees in this calendar);

To confirm receipt of the items above, please contact the Registrar's Office: (902) 494-2450.

2. **To be submitted to the School of Architecture:**
   Admissions, School of Architecture
   Dalhousie University
   5410 Spring Garden Road
   P.O. Box 1000
   Halifax, NS, B3J 2X4

MArch applicants:

- graduate application form (Part A - copies 2 and 3) and supplementary application form (Part B);
- an official academic transcript from all previous post-secondary institutions (to be sent directly by the institution);
- evidence of competency in English for applicants whose native language is not English (see Graduate Studies Admission Requirements in this calendar);
- a letter written by the applicant, describing his/her interest in architecture and in the MArch program, and giving the Admissions Committee some information about the applicant as a person: aspirations, interests, travel, etc. The letter must also include a brief description of a proposed topic for a thesis;
- a portfolio of design work that demonstrates the applicant's architectural design ability. Three-dimensional objects and large works should be included as photographs so that the portfolio can be sent safely and easily through the mail. The portfolio need not be large or elaborate; a folder or binder is sufficient. The applicant's name and address should be identified on the portfolio and any separate items;
- two letters of recommendation, including at least one from an academic instructor with close personal knowledge of the applicant's academic background. Each recommendation must be submitted on a Confidential Reference Letter form.

MArch (Post-Prof.) and MEDS applicants:

- graduate application form (Part A - copies 2 and 3) and supplementary application form (Part B);
- an official academic transcript from all previous post-secondary institutions (to be sent directly by the institution);
- evidence of competency in English for applicants whose native language is not English (see Graduate Studies Admission Requirements in this calendar);
- a letter that indicates the graduate position for which the applicant is applying (selected from the "Graduate Positions" page on the School of Architecture Website), summarizes the applicant's previous academic / work in this area, and describes his/her career aspirations;
- MArch (Post-Prof.) applicants should include a portfolio of advanced architectural design work, especially work done in the proposed subject area. Additional design work (drawings, furniture, construction projects, etc.) may also be included. For MEDS applicants, a design portfolio is optional.
- two letters of recommendation, including at least one from an academic instructor with close personal knowledge of the applicant's academic background. Each recommendation must be submitted on a Confidential Reference Letter form.

To confirm receipt of the items above, please contact the Graduate Architectural Secretary, at grad.arch.office@dal.ca or by telephone (902) 494-3973.

Dalhousie Year 4 BEDS students who apply directly to the MArch program are required to submit an application form and a statement about the proposed area of focus in the graduate program to the Architecture office by February 1, followed by a design portfolio at the end of the winter term. An application fee, transcripts, introductory letter, and letters of recommendation are not required.

C. Application Deadline

For the Master of Architecture program, the deadline for applications from Canada and the United States is February 1. The deadline for applications from all other countries is December 1.

Transfer students with a pre-professional architecture degree who may not have completed classes that are equivalent to all required Dalhousie BEDS subjects should apply by November 1 and anticipate taking one or more qualifying classes in the winter term.

VIII.Graduate Regulations

School of Architecture Regulations

In addition to the Faculty of Graduate Studies regulations in this calendar, refer to the 'Current Students' section of the School of Architecture Website for academic regulations.

IX. Graduate Classes Offered

A. Master of Architecture

Year 5 - Terms M1 and M2 (Summer and Fall)

- two core classes in Design (ARCH 50xx.06 series)
- two core classes in Humanities (ARCH 51xx.03 series)
- two core classes in Technology (ARCH 52xx.03 series)
- two graduate electives (from 'Core Classes' or 'Electives' below)

Year 5 - Terms M3 and M4 (Winter and Summer)

- ARCH 5308.03: Professional Practice (Co-op Work Term)
- ARCH 5309.03: Professional Practice (Co-op Work Term)

Students extending their work term register for ARCH 5310.00: Co-op Work Term Continuation.

Before entering Year 6, a student must pass a Year 5 review to confirm that all Year 5 requirements and an approved thesis proposal have been completed. Year 6 begins in Fall or Winter, depending on the scheduled teaching terms of a student's thesis supervisor. Students who enter M5 in Winter extend their work term by registering for ARCH 5310.00: Co-op Work Term Continuation during the Fall term.

Year 6 - Term M5 (Fall or Winter)

- ARCH 9007.06: MArch Thesis Preparation
- three graduate electives (ARCH 5xxx.03 or ARCH 6xxx.03)

Year 6 - Term M6 (Winter or Summer)

- ARCH 5311.03: Professional Practice [winter term only]
- ARCH 9008.06: MArch Thesis
- one graduate elective (ARCH 5xxx.03 or ARCH 6xxx.03)

Graduate Classes

Core Classes - Design

- ARCH 5002.06: Urban Housing Studio
- ARCH 5003.06: Adaptive Reuse Studio
- ARCH 5004.06: Urban Systems Studio
- ARCH 5005.06: Material Detail Studio
- ARCH 5006.06: Light Frame Building Studio
- ARCH 5007.06: Landscape Studio
- ARCH 5008.06: Transhistorical Studio
- ARCH 5009.06: Ephemeral Architecture Studio
- ARCH 5010.06: Public Architecture Studio
- ARCH 5011.06: Coastal Studio

Core Classes - Humanities

- ARCH 5102.03: Housing Theory
- ARCH 5103.03: Residential Real Estate Development

- ARCH 5104.03: Urban Systems
- ARCH 5105.03: History and Theory of Cities
- ARCH 5106.03: International Sustainable Development
- ARCH 5107.03: Theory and the Built Environment
- ARCH 5108.03: Architectural Theory of the Enlightenment
- ARCH 5109.03: Ephemeral Architecture
- ARCH 5110.03: Architectural Exhibitions
- ARCH 5111.03: Integrated Coastal and Ocean Planning
- ARCH 5112.03: Documentation and Conservation of the Modern Movement in Architecture
- ARCH 5198.03: Humanities Seminar

Core Classes - Technology

- ARCH 5202.03: From Timber to Lumber
- ARCH 5203.03: From Lumber to Structure
- ARCH 5204.03: Composite Materials
- ARCH 5205.03: Earth Construction
- ARCH 5206.03: Natural Finishes
- ARCH 5207.03: Light and Material
- ARCH 5208.03: Acoustics
- ARCH 5209.03: Energy Efficient Design
- ARCH 5210.03: Life Cycle Analysis
- ARCH 5211.03: The Construction Detail
- ARCH 5212.03: From Principle to Detail
- ARCH 5213.03: Facades
- ARCH 5214.03: Tensile Architecture
- ARCH 5215.03: Fabrication
- ARCH 5298.03: Technology Seminar

Electives

- ARCH 6001.03: Design Seminar
- ARCH 6002.03: Free Lab
- ARCH 6121.03: Architecture and Archaeoastronomy
- ARCH 6122.03: Humanities Seminar
- ARCH 6209.03: Material Investigation
- ARCH 6210.03: Material Investigation in Wood
- ARCH 6211.03: Technology Seminar
- ARCH 6304.03: Entrepreneurship
- ARCH 6305.03: Permission to Build
- ARCH 6306.03: Professional Practice Seminar
- ARCH 6501.03: Graphic Design in Architecture
- ARCH 6502.03: Painting in Architecture
- ARCH 6503.03: Photography in Architecture
- ARCH 6504.03: Montage in Architecture
- ARCH 6505.03: Multimedia in Architecture
- ARCH 6506.03: Spatial Constructions in Digital Video
- ARCH 6507.03: Language as Representation
- ARCH 6508.03: Alternatives to Perspective
- ARCH 6509.03: Digital Form
- ARCH 6510.03: Architectural Documentation and Analysis
- ARCH 6511.03: Documentation of Historic Buildings
- ARCH 6512.03: Developments in Architectural Representation
- ARCH 6513.03: Representation Seminar

For a graduate elective, a student may take a class offered by another department at Dalhousie University. The subject need not be directly related to architecture, but must be at a graduate level or equivalent. A maximum of two electives may be undergraduate classes that have been elevated to a graduate equivalent by the instructor and approved by the School and by Graduate Studies. With a Letter of Permission, a student may also take a class at another university, if the class is not available at Dalhousie University.

B. Master of Architecture (Post-Professional)

- ARCH 7001.04: MArch (Post-Prof.) Major Project
- ARCH 7003.00: Continuation - MArch (Post-Prof.) Major Project
- ARCH 9002.08: MArch (Post-Prof.) Thesis
- ARCH 9005.00: Continuation - MArch (Post-Prof.) Thesis

Other available classes are listed in the Master of Architecture section above and in the Planning section of this calendar.

C. Master of Environmental Design Studies

- ARCH 7002:04: MEDS Major Project
- ARCH 7004.00: Continuation - MEDS Major Project
- ARCH 9003.08: MEDS Thesis
- ARCH 9006.00: Continuation - MEDS Thesis

Other available classes are listed in the Master of Architecture section above and in the Planning section of this calendar.

X. Graduate Class Descriptions

Class Numbers

The first digit of an ARCH class number indicates whether it is an MArch core class (5), an elective (6), MArch (Post-Prof)/MEDS class (7), or Thesis (9). The second digit indicates the area of study: Design (0), Humanities (1), Technology (2), Professional Practice (3), or Representation (5). Classes have various credit-hour extensions (03-06) that indicate the approximate class hours each week and the appropriate balance of subjects for professional accreditation.

ARCH 5002.06: Urban Housing Studio.

This studio explores the aesthetic, tectonic, social/cultural and economic challenges presented by contemporary high-density, mixed-use development. The relationships of architecture to urbanism, and building to city, will be explored through exemplary precedents and the design of housing and its associated commercial, institutional, and recreational components.
INSTRUCTOR(S): J. G. Wanzel
FORMAT: Studio
CO-REQUISITE: ARCH 5102.03 or ARCH 5103.03
RESTRICTION: Graduate Students - Architecture

ARCH 5003.06: Adaptive Reuse Studio.

This class studies architectural design through the adaptation of an existing building. It examines tensions between existing built facts (structure, enclosure, and circulation) and new ambitions (habitation, construction, and cultural representation). It also considers historical and urban contexts and the heritage value of existing buildings.
INSTRUCTOR(S): S. Mannell
FORMAT: Studio
RESTRICTION: Graduate students - Architecture

ARCH 5004.06: Urban Systems Studio.

This studio examines the infrastructure of the metropolis and its influence on urban form and development. Topics include systems for transportation, energy use, water distribution, civic institutions, spaces of social exchange, and ecology. Students develop urban infrastructure propositions with reference to innovative urban projects worldwide.
INSTRUCTOR(S): C. Macy
FORMAT: Studio
CO-REQUISITE: ARCH 5104.03
RESTRICTION: Graduate students - Architecture

ARCH 5005.06: Material Detail Studio.

This studio uses bricolage as a method to represent architectural ideas, observations, and intentions in a built artifact. Students interpret, modify, and project material details in architecture. The conceptual development of the work informs strategies for the development of an architectural design.
INSTRUCTOR(S): R. Mullin
FORMAT: Studio
RESTRICTION: Graduate students - Architecture

ARCH 5006.06: Light Frame Building Studio.

This class studies the material and constructional orders of light-weight framing and cladding systems. Through drawing, model, and full-scale construction, case studies of buildings by modern and contemporary designers inform design projects for a multiple residential or small institutional building.
INSTRUCTOR(S): S. Mannell
FORMAT: Studio
RESTRICTION: Graduate students - Architecture

ARCH 5007.06: Landscape Studio.

This studio investigates architectural responses to landscape. It regards the land as a physical and cultural context requiring appropriate methods of visualization and representation. Referring to recent projects in land art, it considers how to engage local materials and interests while promoting the sustainable occupation of a particular site.
INSTRUCTOR(S): B. Lilley, N. Savage
FORMAT: Studio
RESTRICTION: Graduate students - Architecture

ARCH 5008.06: Transhistorical Studio.

This studio incorporates architectural design and architectural history - not for direct practical applications such as conservation, but for considering more basic definitions of architecture, roles of the architect, and elements of practice. Historical and/or cultural differences provide the framework for a speculative design project. The studio also involves strategies for defining a project and mapping characteristics of program and site.
INSTRUCTOR(S): S. Parcell
FORMAT: Studio
RESTRICTION: Graduate students - Architecture

ARCH 5009.06: Ephemeral Architecture Studio.

This studio examines temporal, fleeting and ephemeral architecture, in contrast to the permanent, monumental, and timeless architecture that has been stressed throughout history. Students address concepts of alterity, the carnivalesque, *l'informe*, and inversion by designing spaces and/or activities on the edges of the established order.
INSTRUCTOR(S): S. Bonnemaison
FORMAT: Studio
CO-REQUISITE: ARCH 5109.03
RESTRICTION: Graduate students - Architecture

ARCH 5010.06: Public Architecture Studio.

This studio examines the role of public architecture in manifesting cultural values through the design of a civic institution. It also considers a public architecture as an expression of material culture that mediates between the scales of artifact and landscape.
INSTRUCTOR(S): B. MacKay-Lyons
FORMAT: Studio
RESTRICTION: Graduate students - Architecture

ARCH 5011.06: Coastal Studio.

This studio investigates building on the coast. It explores conjunctions of ecology, culture, and traditional technical knowledge. Through participatory design, students work with a coastal community to develop innovative responses to situations with sensitive ecologies, extreme climate, and local cultural traditions.
INSTRUCTOR(S): T. Cavanagh
FORMAT: Studio
RESTRICTION: Graduate students - Architecture

ARCH 5102.03: Housing Theory.

This class introduces the history and theory of contemporary practice in housing design and production. The focus is on the quality of housing and the residential environment. A comparative analysis of significant past and current examples is used to provide insight into the way houses and neighborhoods are designed. This understanding is placed in the context of differing economic, political and housing market situations.
INSTRUCTOR(S): J. G. Wanzel
FORMAT: Lecture/seminar
CROSS-LISTING: PLAN 6111.03
RESTRICTION: Graduate students - Architecture and Planning or permission of instructor

ARCH 5103.03: Residential Real Estate Development.

This seminar explores the interaction of the residential construction industry's constituent parts: real estate, finance, government policy and programs, development interests, etc., and addresses questions of housing quality and distribution, employment, industrialization, urbanization, regional and rural under-development, foreign ownership, and the role of the industry in the Canadian political economy.
INSTRUCTOR(S): J. G. Wanzel
FORMAT: Seminar
RESTRICTION: Graduate students - Architecture and Planning or permission of instructor

ARCH 5104.03: Urban Systems.

This seminar examines the infrastructure of the metropolis and its influence on urban form and development. It considers transportation, energy use, water distribution, civic institutions, spaces of social exchange, and ecological systems. It emphasizes new concepts of what is "urban" and what is "natural," referring to innovative urban designs worldwide.
INSTRUCTOR(S): C. Macy
FORMAT: Lecture/seminar
RESTRICTION: Graduate students - Architecture and Planning or permission of instructor

ARCH 5105.03: History and Theory of Cities.

This class examines selected major cities, their originating form, important buildings, and building types in their history. The primary aim is to explore the relationship between architecture and urbanism and the relationship between individual buildings and the city.
INSTRUCTOR(S): T. Galvin
FORMAT: Lecture/seminar
RESTRICTION: Graduate students - Architecture and Planning or permission of instructor

ARCH 5106.03: International Sustainable Development.

This class examines sustainable development in developed and developing countries. Local building practices and cultural appropriateness are studied through case studies. It considers how architects have handled materials and technology to engender patterns of living in a reflective and symbiotic manner
INSTRUCTOR(S): T. Galvin
FORMAT: Seminar
PREREQUISITE: or CO-REQUISITE: ARCH 5102.03 or ARCH 5205.03
RESTRICTION: Graduate students - Architecture

ARCH 5107.03: Theory and the Built Environment.

This class is an overview of contemporary architectural theory, structured into three themes: architecture as a poetic act, moral act, and meaningful act. These themes allow students to develop their research and design interests in the graduate program. In a major project, students translate theoretical concerns into an architectural installation.
INSTRUCTOR(S): C. Macy, S. Bonnemaison
FORMAT: Lecture/seminar
RESTRICTION: Graduate students - Architecture and Planning or permission of instructor

ARCH 5108.03: Architectural Theory of the Enlightenment.

This class focuses on the phenomenon of the Enlightenment and the search for origins. The terms "Classic" and "Romantic" are examined in depth, as are archaeology, the culture of ruins, historiography, association theory, and the Picturesque. Architectural theories are compared with selected works of architecture and architectural representation.
INSTRUCTOR(S): T. Galvin
FORMAT: Lecture/seminar
RESTRICTION: Graduate students - Architecture and Planning or permission of instructor

ARCH 5109.03: Ephemeral Architecture.

This seminar explores ideas of "otherness" in the city, manifested as ephemeral or temporary constructions and as critical responses to established norms. Theories of alterity, the carnivalesque, *l'informe* and inversion are used to interpret spaces and activities in the city that are marginal, liminal, repressed, neglected, or abandoned.
INSTRUCTOR(S): S. Bonnemaison
FORMAT: Lecture/seminar
RESTRICTION: Graduate students - Architecture and Planning or permission of instructor

ARCH 5110.03: Architectural Exhibitions.

This seminar introduces students to contemporary discussions in the field of exhibit design for architecture, including the role of the viewer, the use of display techniques to frame objects, and the curatorial voice. Groups of students develop an exhibition on a subject of their choice.
INSTRUCTOR(S): S. Bonnemaison
FORMAT: Seminar/studio
RESTRICTION: Graduate students - Architecture and Planning or permission of instructor

ARCH 5111.03: Integrated Coastal and Ocean Planning.

This studio-based class introduces spatial planning of coasts and oceans. It integrates environmental design, planning, policy, and management. It emphasizes tools and processes for professional field work, analysis, and synthesis. Students gain practical experience of theory, practice and professional aspects of coastal planning by drafting plans or proposals for action.
INSTRUCTOR(S): T. Cavanagh
FORMAT: Seminar/studio
RESTRICTION: Graduate students - Architecture and Planning or permission of instructor
CROSSLISTING: MARA 5014.03

ARCH 5112.03: Documentation and Conservation of the Modern Movement.

This class studies the documentation and conservation of buildings, sites and neighborhoods of the Modern Movement. It examines international charters, protocols, and issues of identifications, evaluation and public awareness. Students undertake fieldwork and research on specific projects and contribute to a general register of modern works.
INSTRUCTOR(S): S. Mannell
FORMAT: Lecture/seminar
RESTRICTION: Graduate students - Architecture and Planning or permission of instructor

ARCH 5198.03: Humanities Seminar.

This class focuses on an advanced topic in architectural humanities. The topic changes from year to year. It may emphasize history, theory, criticism, urban studies, or architecture in development.
INSTRUCTOR(S): Staff
FORMAT: Seminar
RESTRICTION: Graduate students - Architecture and Planning or permission of instructor

ARCH 5202.03: From Timber to Lumber.

This class examines the manufacturing process that converts a tree into dimensional lumber. Topics include tree growth, wood structure, woodlot management, sustainable forest management and certification, sawmill operations, grading, the physical properties and moisture relations of wood, and the design of air drying sheds and kilns.
INSTRUCTOR(S): A. Parsons
FORMAT: Lecture/seminar
RESTRICTION: Graduate students - Architecture

ARCH 5203.03: From Lumber to Structure.

This class studies how dimensional lumber is used in current North American building construction. It considers the structural and mechanical properties of wood, structural engineering principles for dealing with gravity and lateral loads, and building details that are used in platform frame and timber frame construction.
INSTRUCTOR(S): A. Parsons
FORMAT: Lecture/seminar
RESTRICTION: Graduate students - Architecture

ARCH 5204.03: Composite Materials.

This class surveys the history of materials, focusing on natural and synthetic polymers, resins, and composite material systems. It studies their origin, chemical content, and manufacturing processes. These materials and their related processes are used to fabricate functional objects, with attention to structure, assembly, and environmental impact.
INSTRUCTOR(S): R. Mullin
FORMAT: Seminar
RESTRICTION: Graduate students - Architecture

ARCH 5205.03: Earth Construction.

This class studies traditional and contemporary methods of earth construction (cob, rammed earth, wattle and daub, earth bag, and adobe) as sustainable, low-impact building systems. Based on the science of soils, it considers appropriate uses of earth technology in the construction of houses.
INSTRUCTOR(S): Staff
FORMAT: Lecture/seminar
RESTRICTION: Graduate students - Architecture and Planning or permission of instructor

ARCH 5206.03: Natural Finishes.

This class examines the use of natural finishes (earth and lime plasters, paint, stone, and wood) for walls, floors, and ceilings in contemporary buildings. Natural, local, and reused materials are assessed in terms of installation, cost, durability, aesthetic characteristics, and environmental impact in comparison with industrialized products.
INSTRUCTOR(S): Staff
FORMAT: Lecture/seminar
RESTRICTION: Graduate students - Architecture and Planning or permission of instructor

ARCH 5207.03: Light and Material.

This class examines characteristics of daylight and artificial light. It analyzes and experiments with how light is produced, is transmitted, and interacts with various materials. By considering lighting options for a particular use, it regards light as an integral element in the design of interior and/or exterior space.
INSTRUCTOR(S): Staff
FORMAT: Lecture/seminar
RESTRICTION: Graduate students - Architecture

ARCH 5208.03: Acoustics.

This seminar studies principles of interior room acoustics and audio-visual design. To address acoustical requirements in various types of spaces, it considers sound projection and isolation, and the control of mechanical and environmental noise through building design and acoustical materials.
INSTRUCTOR(S): Staff
FORMAT: Seminar
RESTRICTION: Graduate students - Architecture

ARCH 5209.03: Energy Efficient Design.

This class focuses on sustainable building services. It studies building energy codes and rating systems - specifically LEED - in the Atlantic region. It also examines international strategies for low-energy building; passive systems in ventilation, heating, and cooling; renewable energy systems; and the integration of engineering systems into architectural design.
INSTRUCTOR(S): Staff
FORMAT: Seminar
RESTRICTION: Graduate students - Architecture

ARCH 5210.03: Life Cycle Analysis.

This class studies how to assess the full range of costs and environmental impacts of building materials and assemblies, from their initial raw material to the end of their useful life, including recycling. A focus on building envelope shows how life cycle analysis can influence decisions on materials and assemblies.
INSTRUCTOR(S): Staff
FORMAT: Lecture/seminar
RESTRICTION: Graduate students - Architecture

ARCH 5211.03: The Construction Detail.

This class examines the construction detail and its dialectical relationship to the architectural whole. Case studies of details in major twentieth-century buildings inform detail practice, in which students investigate material options and construction details for a project of their own design.

INSTRUCTOR(S): S. Mannell
FORMAT: Seminar
RESTRICTION: Graduate students - Architecture

ARCH 5212.03: From Principle to Detail.

This class advances the technological content of a concurrent design project or thesis. It focuses on the integration of building systems (e.g., structure, construction, environmental technology), beginning with an overview of principles, followed by a self-directed material exploration, and culminating in the production of a relevant building detail.
INSTRUCTOR(S): B. Lilley
FORMAT: Studio/seminar
RESTRICTION: Graduate students - Architecture

ARCH 5213.03: Facades.

This class examines the various functions of a building facade: protection from weather, interior comfort, urban sign, and potential energy producer. It considers how a facade designed for a particular program can achieve high performance through attention to detail: building materials, manufacturing processes, and construction techniques.
INSTRUCTOR(S): B. Lilley
FORMAT: Seminar
RESTRICTION: Graduate students - Architecture

ARCH 5214.03: Tensile Architecture.

This class studies the design and behavior of tensile structures by building and testing models and mock-ups. It also explores the rhetorical potential of tensile structures by integrating technologies such as video, sound, light, sensors, and smart fabrics.
INSTRUCTOR(S): S. Bonnemaison
FORMAT: Lecture/seminar
RESTRICTION: Graduate students - Architecture

ARCH 5215.03: Fabrication.

This class studies the sequence of trades involved in building construction. It examines the material processes of various construction industries and considers their implications for design, with an emphasis on relations between convention and innovation.
INSTRUCTOR(S): T. Sweetapple
FORMAT: Seminar
RESTRICTION: Graduate students - Architecture

ARCH 5298.03: Technology Seminar.

This class focuses on an advanced topic in architectural technology. The topic changes from year to year. It may emphasize materials, environmental strategies, or building details.
INSTRUCTOR(S): Staff
FORMAT: Seminar
RESTRICTION: Graduate students - Architecture

ARCH 5308.03/5309: Professional Practice (Co-op Work Term).

A student works in the architectural profession for 1000 hours in no less than 24 weeks and completes a research report or assignment. Work placements must be approved by the School of Architecture. A student may apply to satisfy up to 500 hours through supervised research related to Professional Practice.
INSTRUCTOR(S): Staff
FORMAT: Work term
RESTRICTION: MArch students

ARCH 5310.00: Co-op Work Term Continuation.

A student who has already registered for ARCH 5308 and ARCH 5309 may continue the co-op work term for up to four additional terms. While registered in ARCH 5310, a student's university status changes to part-time.
INSTRUCTOR(S): Staff
FORMAT: Work term
PREREQUISITE: ARCH 5308.03, ARCH 5309.03
RESTRICTION: MArch students

ARCH 5311.03: Professional Practice.

This class studies principles of professional ethics, partnerships, corporate practices, professional responsibility, and legal aspects of architectural practice. It also considers issues in practice management: contracts, codes, reference documents, finance, costing techniques, and contract administration.
INSTRUCTOR(S): N. Savage
FORMAT: Lecture/seminar
RESTRICTION: Graduate students - Architecture

ARCH 6001.03: Design Seminar.

This seminar focuses on an advanced topic in architectural design. The topic changes from year to year. It may emphasize urbanism, landscape, building, process, program, or habitation.
INSTRUCTOR(S): Staff
FORMAT: Seminar/studio
RESTRICTION: Graduate students - Architecture

ARCH 6002.03: Free Lab.

This class complements normal studio-based learning. It pursues an architectural topic through experimental hands-on work in a group format. Topics change from year to year and may include design-build work, documentaries, landscape installations, community design projects, and interdisciplinary work. Projects may be local or involve travel to a distant site.
INSTRUCTOR(S): Staff
FORMAT: Workshop/lab
RESTRICTION: Graduate students - Architecture

ARCH 6121.03: Architecture and Archaeoastronomy.

This course studies the significance of the night sky to various ancient and non-Western cultures, including the Egyptian, Celtic, Mesoamerican, Anasazi, and First Nations. It examines how celestial features and motions guided the design of buildings and influenced cultural practices, including the measurement of time.
INSTRUCTOR(S): P. Kelly
FORMAT: Lecture/seminar
RESTRICTION: Graduate students - Architecture and Planning or permission of instructor

ARCH 6122.03: Humanities Seminar.

This class focuses on an advanced topic in architectural humanities. The topic changes from year to year. It may emphasize history, theory, criticism, urban studies, or architecture in development.
INSTRUCTOR(S): Staff
FORMAT: Seminar
RESTRICTION: Graduate students - Architecture and Planning or permission of instructor

ARCH 6209.03: Material Investigation.

This class uses a controlled workshop environment to examine characteristics of a material (e.g., metal, ceramic, glass) and methods for forming and finishing. Using principles of material science, it considers the harvesting or processing of raw material, the testing of structural capacity and environmental behavior, and applications in design.
INSTRUCTOR(S): Staff
FORMAT: Workshop/seminar
RESTRICTION: Graduate students - Architecture

ARCH 6210.03: Material Investigation in Wood.

This class uses a controlled workshop environment to examine characteristics of wood and methods for forming and finishing. Using principles of material science, it considers the harvesting of raw material, the testing of structural capacity and environmental behavior, and applications in design.
INSTRUCTOR(S): Staff
FORMAT: Workshop/seminar
RESTRICTION: Graduate students - Architecture

ARCH 6211.03: Technology Seminar.

This class focuses on an advanced topic in architectural technology. The topic changes from year to year. It may emphasize materials, environmental strategies, or building details.
INSTRUCTOR(S): Staff
FORMAT: Seminar
RESTRICTION: Graduate students - Architecture

ARCH 6304.03: Entrepreneurship.

Successful entrepreneurship requires an ability to identify opportunities, skill to calculate risks, and the knowledge and determination to promote, develop, and implement a project. This class uses a case study approach to examine entrepreneurship in the public, private, and not-for-profit sectors and to assess potential applications to architectural practice.
INSTRUCTOR(S): J. G. Wanzel
FORMAT: Lecture/seminar
RESTRICTION: Graduate students - Architecture and Planning or permission of instructor

ARCH 6305.03: Permission to Build.

Obtaining a building permit is only the last hurdle to clear before a potential architectural project can be realized. This class examines the entire process, including the various authorities, agencies, and groups that are involved, along with municipal planning regulations, building codes, material specifications, and public presentations.
INSTRUCTOR(S): N. Savage
FORMAT: Lecture/seminar
RESTRICTION: Graduate students - Architecture and Planning or permission of instructor

ARCH 6306.03: Professional Practice Seminar.

This class focuses on an advanced topic in architectural professional practice. The topic changes from year to year.
INSTRUCTOR(S): Staff
FORMAT: Seminar
RESTRICTION: Graduate students - Architecture and Planning or permission of instructor

ARCH 6501.03: Graphic Design in Architecture.

This class applies principles of information design and typography to architectural presentation. Using digital media, it experiments with various graphic design methods to organize text, images, and graphics in a clear, consistent way for particular presentation purposes.
INSTRUCTOR(S): Staff
FORMAT: Lecture/seminar
RESTRICTION: Graduate students - Architecture

ARCH 6502.03: Painting in Architecture.

This class examines how some architects have used painting in design development. Through studio work, students also consider how certain modes of painting may be integrated into the design process for their concurrent architectural studio project. Previous experience in any paint medium (e.g., watercolor, gouache, acrylic, oil) is required.
INSTRUCTOR(S): Staff
FORMAT: Lecture/seminar
RESTRICTION: Graduate students - Architecture

ARCH 6503.03: Photography in Architecture.

This class examines architectural photography from the late nineteenth century to the present. By analyzing and applying various photographic styles and techniques, students learn about photographic representation in architecture.
INSTRUCTOR(S): Staff
FORMAT: Lecture/seminar

ARCH 6504.03: Montage in Architecture.

This class examines the history, concepts, and uses of montage in architectural representation. It also considers how digital photography and computer technology can generate various forms of montage for analyzing and developing architectural designs.
INSTRUCTOR(S): Staff
FORMAT: Seminar/studio
RESTRICTION: Graduate students - Architecture

ARCH 6505.03: Multimedia in Architecture.

This class examines the use of various technologies to visualize, develop, and display multimedia presentations of architecture that may include text, graphics, photographs, sound, voice, animation, and/or video. It also considers how architectural designs can be developed using multimedia. These topics may apply also to projects in urban planning.
INSTRUCTOR(S): P. Kelly
FORMAT: Lecture/seminar
RESTRICTION: Graduate students - Architecture and Planning or permission of instructor

ARCH 6506.03: Spatial Constructions in Digital Video.

This seminar investigates how digital audio and video can represent physical and spatial qualities of existing architectural, urban, or rural conditions. It emphasizes the use of the video camera and digital software for recording, imaging, and editing.
INSTRUCTOR(S): C. Venart
FORMAT: Studio/seminar
RESTRICTION: Graduate students - Architecture

ARCH 6507.03: Language as Representation.

This class examines the reciprocal role of language and visual perception in architecture. It considers architectural description and criticism according to linguistic or dialectical models such as the theory of language games, classical rhetoric, or religious apology.
INSTRUCTOR(S): Staff
FORMAT: Lecture/seminar
RESTRICTION: Graduate students - Architecture

ARCH 6508.03: Alternatives to Perspective.

This class examines the limitations of linear perspective as a definitive method for representing objects and spaces. It analyzes Renaissance premises of perspective and considers other periods and cultures for alternatives that might be applied in contemporary architectural representation.
INSTRUCTOR(S): Staff
FORMAT: Seminar
RESTRICTION: Graduate students - Architecture

ARCH 6509.03: Digital Form.

This class considers the influence of emerging representational technologies on the making of architectural form. By analyzing how the design process is affected by working only in a digital environment, students learn about the limitations and possibilities of digital form.
INSTRUCTOR(S): N. Savage
FORMAT: Lecture/studio
PREREQUISITE: ARCH 6505.03
RESTRICTION: Graduate students - Architecture

ARCH 6510.03: Architectural Documentation and Analysis.

This class investigates techniques for documenting and analyzing existing architectural or urban conditions. Various modes of representation (drawing, model, video, and photography) are used to interpret the complex experience of physical form.
INSTRUCTOR(S): C. Venart
FORMAT: Lecture/seminar
RESTRICTION: Graduate students - Architecture

ARCH 6511.03: Documentation and Reconstruction of Historic Buildings.

This class studies the use of drawings to document existing buildings, structures, and landscapes. It also studies drawings as a means of projection and examines their role in the reconstruction of past built works and projects.
INSTRUCTOR(S): S. Mannell
FORMAT: Lecture/seminar
RESTRICTION: Graduate students - Architecture

ARCH 6512.03: Developments in Architectural Representation.

This class studies historical developments in the graphic language of architecture and its various modes of representation. By examining works by selected architects, students consider relationships between what is drawn and what is built.
INSTRUCTOR(S): N. Savage
FORMAT: Lecture/studio
RESTRICTION: Graduate students - Architecture

ARCH 6513.03: Representation Seminar.

This class focuses on an advanced topic in architectural representation. The topic changes from year to year. It may emphasize medium, relation to design, or history and theory.
INSTRUCTOR(S): Staff
FORMAT: Seminar/studio
RESTRICTION: Graduate students - Architecture

ARCH 7001.04: MArch (Post-Prof.) Major Project.

A major project is intended to address a question of personal interest and relevance to the field of study. It may be a work of design (accompanied by a written document) or an entirely written document. The major project is guided by a supervisor and an advisor.
RESTRICTION: MArch (Post-Prof.) students

ARCH 7002.04: MEDS Major Project.

A major project is intended to address a question of personal interest and relevance to the field of study. It may be a work of design (accompanied by a written document) or an entirely written document. The major project is guided by a supervisor and an advisor.
RESTRICTION: MEDS students

ARCH 7003.00: Continuation - MArch (Post-Prof.) Project.

Continuation of ARCH 7001.04.
RESTRICTION: MArch (Post-Prof.) students

ARCH 7004.00: Continuation - MEDS Project.

Continuation of ARCH 7002.04.
RESTRICTION: MEDS students

ARCH 9002.08: MArch (Post-Prof.) Thesis.

A thesis is intended to address a question of personal interest and relevance to the field of study. It may be a work of design (accompanied by a written document) or an entirely written document. The thesis is guided by a supervisor and an advisor. The student presents the work at an oral examination, and the thesis document is prepared in accordance with university thesis standards and submitted to the University.
RESTRICTION: MArch (Post-Prof.) students

ARCH 9003.08: MEDS Thesis.

A thesis is intended to address a question of personal interest and relevance to the field of study. It may be a work of design (accompanied by a written document) or an entirely written document. The thesis is guided by a supervisor and an advisor. The student presents the work at an oral examination, and the thesis document is prepared in accordance with university thesis standards and submitted to the University.
RESTRICTION: MEDS students

ARCH 9005.00: Continuation - MArch (Post-Prof.) Thesis.

Continuation of ARCH 9002.08.
RESTRICTION: MArch (Post-Prof.) students

ARCH 9006.00: Continuation - MEDS Thesis.

Continuation of ARCH 9003.08.
RESTRICTION: MEDS students.

ARCH 9007.06: MArch Thesis Preparation.

Within a seminar group, each student formulates a thesis question and pursues it through a preliminary design for a building of some kind. The student is expected to become fluent in the history and theory of the topic. ARCH 9007 and ARCH 9008 must be completed in consecutive terms.
INSTRUCTOR(S): Staff
FORMAT: Seminar/studio
PREREQUISITE: Completion of Year 5 MArch
RESTRICTION: MArch students

ARCH 9008.06: MArch Thesis.

Following a term of thesis preparation, each student completes an architectural design project. The thesis concludes with a graphic/model presentation, an oral examination, and a formal thesis document that is submitted to the university. The entire thesis requires a minimum of two consecutive terms of residence.
INSTRUCTOR(S): Staff
FORMAT: Studio
PREREQUISITE: ARCH 9007
RESTRICTION: MArch students

ARCH 9009.00: MArch Thesis Continuation.

This continuation of ARCH 9008: M.Arch Thesis is for students who have not completed the thesis in the minimum two terms. The maximum duration of a thesis is five terms.
INSTRUCTOR(S): Staff
FORMAT: Studio
PREREQUISITE: ARCH 9008
RESTRICTION: MArch students

Atmospheric Science

Location: Physics and Atmospheric Science Department
Sir James Dunn Building
Halifax, NS B3H 3J5
Website: www.atm.dal.ca

Chairperson of Department
Rotermund, H.H., (902) 494-2342

Coordinator, Atmospheric Science
Drummond, J.R. (902) 494 2324

Professors
Drummond, J.R., BA, MA, PhD (Oxford), FRSC-Canada Research Chair, Remote Sounding of Atmospheres
Geldart, D.J.W., BSc (Acadia), PhD (McMaster) FRSC- Research
Greatbatch, R.J., BSc (Liverpool), PhD (Cambridge) NSERC/MARTEC/AES Research (Chair), primary appointment with Oceanography

Associate Professors
Duck, T., BSc, PhD (York)
Folkins, I., BSc (Dal), MSc, PhD (Toronto)
Lesins, G.B., PhD (Toronto) (Research)
Martin, R.V., BS (Cornell), MS, PhD (Harvard)

Adjunct Professors
Chylek, P., PhD (U of Cal), LANL
Lohmann, U., PhD (Hamburg), ETH, Zurich Switzerland
Ritchie, H.C., PhD (McGill), MSC

Postdoctoral Fellows/Research Associates
Lamsal, L., PhD (Univertisät Bremen)
Pangaluru, K., (Sri Venkateswara University)
Sudiarta, W., PhD (Dalhousie University)

I. Introduction
Atmospheric Science is part of the Department of Physics and Atmospheric Science and offers programs leading to M.Sc. and Ph.D. degrees in the following areas: cloud physics, aerosol physics and chemistry, dynamics, radiation, atmospheric chemistry, planetary remote sounding from space and the ground, Arctic atmospheres, LIDAR systems and climate modeling.

The Department of Physics and Atmospheric Science also offers programs leading to a Diploma in Meteorology. For more details see the undergraduate calendar.

II. Graduate Degrees
Graduate degrees in Atmospheric Science may be taken through the Departments of Physics and Atmospheric Science or Oceanography. Please see the calendar entry for Physics and Atmospheric Science or Oceanography for more details.

Biochemistry & Molecular Biology

Location: Sir Charles Tupper Medical Building, 9th Floor
Halifax, NS B3H 1X5
Telephone: (902) 494-2480
Fax: (902) 494-1355
Email: GradInfo@webmail.biochem.dal.ca
Website: http://www.biochem.dal.ca

Head of Department
Byers, D.M., BSc, MSc (Dal), PhD (Alberta)

Professors
Bearne, S.L., BSc (Acadia), PhD (Toronto), MDCM (McGill)
Breckenridge, W.C., BSc (Queen's) MSc, PhD (Toronto)
Byers, D.M., BSc, MSc (Dal), PhD (Alberta)
Dobson, M.J., BSc (Dal), DPhil (Oxon)
Doolittle, W.F., AB (Harvard), PhD (Stanford). Post retirement
Gray, M.W., BSc, PhD (Alberta)
Liu, P.X.-Q., BSc (Wuhan), PhD (Cornell)
McMaster, C.R., BSc, PhD (Manitoba), Asst. Dean Graduate and Post Doctoral Studies, Faculty of Medicine, major appointment in Pediatrics
Ridgway, N.D., BSc, MSc (Dal), PhD (UBC), joint appointment with Pediatrics
Ro, H.-S., BSc, PhD (McMaster)
Singer, R.A., AB (Princeton), PhD (Harvard), Graduate Coordinator (Telephone: 494-2306)
Too, C.K.L., BSc, MSc (Malaya), PhD (Hawaii)
Waisman, D.M., BSc (Brandon), PhD (Manitoba)
Wallace, C.J.A., BA, MA, DPhil (Oxon)

Associate Professors
Cook, H.W., BSc, MSc (McGill), PhD (Dal), Dean of Medicine; Professor in Pediatrics
McLeod, R.S., BSc, PhD (UBC)
Roger, A.J., BSc (UBC), PhD (Dal)
Rosen, K.V., BSc, MSc, PhD (Moscow State), joint appointment with Pediatrics

Assistant Professors
Archibald, J.M., BSc, PhD (Dal) Assoc. Graduate Coordinator (Telephone: 494-2306)
Blouin, C., BSc (Laval), PhD (Dal), joint appointment with Computer Science
Dellaire, G., BSc (UBC), PhD (McGill), major appointment in Pathology
Karten, B., MSc (Hamburg), PhD (Graz)
Marignani, P.A., BSc (Windsor), MSc (Western Ontario), PhD (McMaster)
Rainey, J.K., BSc (Guelph), MSc, PhD (Toronto)
Riddell, D.C., BSc, PhD (Queen's), major appointment in Pathology

Adjunct Professor
Ewart, K.V., BSc (Moncton), PhD (MUN), Associate Research Officer, National Research Council, Institute for Marine Biosciences

I. Admission
General requirements for admission to the Faculty of Graduate Studies are given in the Faculty Regulations section of this calendar. In addition, foreign applicants must submit the results of the Graduate Record Examination. A paper-based TOEFL score of at least 600 (computer-based TOEFL score of at least 250) is required of applicants whose native language is not English (see Faculty of Graduate Studies regulations).

II. General Regulations

The Department accepts applicants with honours degrees (or the equivalent) in biochemistry and also those with training in related fields such as biology, chemistry and related biomedical sciences. Advanced knowledge within a a student's chosen area of biochemistry and molecular biology is developed by formal classes and/or guided study arranged for each student through consultation with a supervisory committee. Students also participate in the Biochemistry seminar series (BIOC 5910.06-5913.06) and in teaching/laboratory demonstrating. Scholarship support is available, and students are eligible for the Patrick Prize and the Doug Hogue Award, awarded by the Department to recognise excellence in graduate research. Additional information can be obtained via our Website (**http://www.biochem.dal.ca**).

III. Degree Programs

A. Master of Science (MSc) in Biochemistry & Molecular Biology

A thesis describing original research done by the candidate is prepared and defended orally. A Thesis Supervisory Committee consisting of the research supervisor and two others is appointed to facilitate the research. The minimum residence requirements for the MSc program is usually 1 year (see the Faculty of Graduate Studies regulations). Most students take an additional 12-18 months to complete the thesis.

B. Doctor of Philosophy (PhD) in Biochemistry & Molecular Biology

The preparation and oral defense of a thesis describing an extensive original investigation carried out by the candidate is the major requirement. A Thesis Supervisory Committee consisting of the research supervisor and three others is appointed to facilitate the research. For students admitted directly into the PhD program, and for those requesting transfer from the MSc to the PhD program, a PhD Candidacy Examination related to the subject area of the thesis occurs at the start of the second year of study. The minimum residence requirements for the PhD are 2 years from the MSc and 3 years from the BSc (see the Faculty of Graduate Studies regulations). Most students take an additional 1-2 years to complete the thesis.

C. Master of Science (MSc) in Biochemistry & Molecular Biology/ Neuroscience

The department also participates in the interdisciplinary Neuroscience MSc program.

D. Doctor of Philosophy (PhD) in Biochemistry& Molecular Biology/ Neuroscience

The department also participates in the interdisciplinary Neuroscience PhD program.

E. Master of Science in Computational Biology and Bioinformatics

The department also participates in this joint program along with the Faculty of Computer Science, the Dept. of Biology and the Dept. of Mathematics and Statistics.

IV. Areas of Specialization

A. Molecular Cell Biology and Molecular Genetics

Dellaire, G. - Nuclear Structure and Cancer Biology: genome instability syndromes; cancer biomarkers; the role of nuclear organization in DNA repair, tumour suppression, and cell cycle control.

Dobson, M.J. - Chromosome structure and function: yeast plasmid segregation. Yeast model system for analysis of intracellular trafficking defects in Niemann-Pick C disease.

McMaster, C.R. - Lipid homeostasis: genetic and molecular analysis of lipid metabolism in yeast with an eye to human disease genes; protein structure and function.

Marignani, P.A. - System Biology: molecular signalling of tumour suppressors, maintenance of genome stability, regulation of cell cycle progression, mechanisms mediating cellular migration, and protein kinase signalling.

Riddell, D.C. - Human molecular genetics: tumor suppressor genes. Gene mapping.

Ro, H.-S. - Molecular mechanisms of adiposity (obesity), mammary tumorigenesis (breast cancer) and macrophage activation in atherosclerosis.

Rosen, K.V. - Mechanisms of three-dimensional tumor growth: molecular control of cancer cell survival in the absence of adhesion to the extracellular matrix.

Singer, R.A. - Cell growth control; molecular/genetic analysis of core eukaryotic functions; yeast chromatin regulation and intracellular membrane dynamics (with G.C. Johnston, Microbiology & Immunology).

Too, C.K.L. - Prolactin and steroid hormone action: signal transduction and molecular regulation of tumor cell growth, survival and apoptosis.

Waisman, D.M. - Molecular mechanisms of metastasis and angiogenesis.

B. Comparative Genomics, Proteomics and Molecular Evolution

Archibald, J.M. - Genome evolution, gene transfer, endosymbiosis, molecular phylogeny.

Blouin, C. - Protein evolution and folding, molecular phylogeny, bioinformatics.

Doolittle, W.F. - Genome evolution: genomics, molecular phylogeny, role of lateral gene transfer in phylogeny and evolutionary innovation, origin and evolution of genomic complexity.

Gray, M.W. - Protist genomics: evolution of protist mitochondrial and nuclear genomes; ribosomal RNA, RNA processing and RNA editing.

Liu, P.X.-Q. - Intein and protein splicing: molecular evolution; protein engineering through directed evolution; protein splicing in gene therapy and in proteomics.

Roger, A.J. - Protistan phylogenetics, organelle evolution and evolutionary genomic analysis: protein evolution; anaerobic organelles and phylogenomic method development.

C. Structure, Function and Metabolism of Biomolecules

Bearne, S.L. - Enzyme catalysis and protein engineering: transition state analogues; enzyme inhibition; bio-organic reaction mechanisms; organic synthesis; biochemical recognition; protein modifications; active site architecture; direct evolution; proteomics.

Byers, D.M. - Protein structure and function: role of acyl carrier protein in bacterial growth and pathogenesis; protein mass spectrometry.

Ewart, K.V. - Molecular biochemistry and physiology of fishes: protein structure-function and large-scale gene expression studies in innate immunity and cold adaptation.

Karten, B. - Cholesterol homeostasis in the brain: intracellular cholesterol trafficking and import into mitochondria, synaptic function in Niemann-Pick Type C disease

McLeod, R.S. - Lipoprotein assembly: structure and function of apolipoproteins; regulation of hepatic apoB secretion; lipid metabolism in the hepatocyte.

Rainey, J.K. - Structural biology: studying membrane and extracellular matrix proteins and peptides; peptide synthesis and expression of challenging proteins; biophysical characterization using protein NMR spectroscopy, scanning probe microscopy and complementary techniques.

Ridgway, N.D. - Sphingomyelin, phospholipids and cholesterol: metabolic and coordinate regulation; intracellular transport and vesicle trafficking; role in programd cell death (apoptosis).

Wallace, C.J.A. - Protein engineering: chemical and genetic remodelling of cytochrome *c* for studies of mitochondrial electron transport and protein structure-function relationships.

V. Class Descriptions

Graduate Classes in Biochemistry

Not all classes are offered every year. Please consult the Department.

BIOC 5000.06: Special Topics in Biochemistry.

Students interested in topics not covered in formal classes may ask the department for special classes to meet their needs. The fields in which the department can offer instruction are reflected in the list of faculty research areas.

BIOC 5001.03: Special Topics in Biochemistry.

Students interested in topics not covered in formal classes may ask the department for special classes to meet their needs. The fields in which the department can offer instruction are reflected in the list of faculty research areas.

BIOC 5010.03: Bioinformatics.

This class presents both a theoretical basis for, and the applications of, computing in molecular biology and evolution. A wide range of topics is addressed including the estimation of rates and patterns of mutations, sequence database searching, with an emphasis on phylogenetic analysis of genes and genomes. The content of the class may vary from year to year.
INSTRUCTOR(S): A.J. Roger (coordinator) and C. Blouin
FORMAT: Lecture 3 hours with regular computer-based labs in comparative sequence analysis, database searching, alignment and phylogenetic analysis and introduction to programming for bioinformatics.
PREREQUISITE: BIOC 3400.03 or instructor's consent.

BIOC 5301.03: Biochemistry of Lipids.

The biochemistry and metabolism of a variety of lipids are studied, especially of fatty acids, eicosanoids, steroids, phospholipids and glycolipids with specialized physiological or lipid-second messenger functions. Data from recent literature reports supporting central aspects of lipid metabolism and lipids as second messengers are emphasized. Evaluation is based on a mid-term examination, an oral presentation on an advanced topic in lipid metabolism, an essay and a final examination.
INSTRUCTOR(S): N.D. Ridgway (coordinator), B. Karten and C.R. McMaster
FORMAT: Lecture 3 hours per week
PREREQUISITE: BIOC 3200.03 and BIOC 3300.03, equivalent 3rd year courses or permission of the instructor.

BIOC 5302.03: Lipoproteins: Structure, Biosynthesis and Metabolism.

The plasma lipoproteins are ordered macromolecular complexes of lipids with specific proteins which program the metabolic fate of the lipid component. The levels and distribution of lipoproteins within the blood are intimately connected with the pathogenesis and regression of atherosclerotic vascular disease. The structure of lipoproteins at the physicochemical level, their biosynthesis, assembly and secretion are considered. The metabolism of lipoproteins within the vascular compartment and their subsequent removal by receptor-mediated processes is explored in relation to both lipid transport and genesis/regression of atherosclerotic lesions. Emphasis is placed upon the interpretation of original experimental data reported in the current literature. Evaluation is based upon two term papers and associated seminar presentations.
INSTRUCTOR(S): R.S. McLeod
FORMAT: Seminar/discussion and guided reading, 2 hours per week.
PREREQUISITE: BIOC 3200.03 and BIOC 3300.03, equivalent 3rd year courses or permission of the instructor.

BIOC 5304.03: Integration and Control of Metabolism.

Currently not offered.

BIOC 5305.03: Mechanisms of Signal Transduction.

The emphasis of the course is systems biology. Lecture topics include emergent properties of protein kinases, tumour suppressors, cell cycle, apoptosis, oncogenes, cytoskeletal reorganization and lipids.
INSTRUCTOR(S): P.A. Marignani, (coordinator), K. Rosen, and B. Karten
FORMAT: Lecture 3 hours
PREREQUISITE: BIOC 3200.03, BIOC 3300.03, and BIOC 3400.03 or instructor's consent

BIOC 5401.03: The World of RNA.

Currently not offered.

BIOC 5402.03: Biochemical Evolution.

Currently not offered.

BIOC 5403.03: Genes and Genomes.

This class discusses the organization of genes into genomes. It deals with (i) compartmentalization of genetic material in nuclear and organellar genomes, (ii) the structure, behavior and origins of components of both nuclear and organellar genomes which are not genes (transposable and other repetitive elements, introns), (iii) genetic and physical methods for mapping genomes, and (iv) the significance of genetic organization and higher order chromosomal structure and function. The methodology and prospects of the genomics will be discussed at some length. Evaluation is based on a mid-term examination, a paper and a final examination.
INSTRUCTOR(S): P. Liu
FORMAT: Lecture 3 hours
PREREQUISITE: Permission of instructor

BIOC 5404.03: Gene Expression.

The different mechanisms for regulation of gene expression in bacterial and eukaryotic cells, and their viruses, are emphasized. Topics include genomic, transcriptional, and post-transcriptional modes of regulation. Evaluation is based on a mid-term examination, an essay and oral presentation on a topic selected by the student, and a final examination.
INSTRUCTOR(S): R.A. Singer
FORMAT: Lecture 3 hours
PREREQUISITE: Introductory molecular biology equivalent to BIOC 2030.03, BIOC 3400.03 and MICI 3033.03, or permission of the instructor

BIOC 5501.03: Medical Biotechnology I.

This class covers the fundamental principles of biotechnology from a medical perspective. Topics covered will include: recombinant DNA technology, polymerase-chain reaction-based applications, DNA microarrays, immunochemical techniques and applications, production of transgenic organisms, potential applications for embryonic stem cell and nuclear transfer cloning. Business and legal aspects of biotechnology will also be presented.
INSTRUCTOR(S): M.J. Dobson
FORMAT: Lectures, discussions, presentations
PREREQUISITE: Consent of instructor

BIOC 5603.03: Advanced Laboratory in Biochemical Techniques.

This class will consist of 2 laboratory modules (each of 4 weeks duration, one full day per week) and a scientific writing module (9 hours in total of tutorials and computer-based assignments) organized collaboratively by the departments of Biochemistry & Molecular Biology, and Microbiology & Immunology. A choice of modules is offered in 2 lab sections covering techniques used in the study of molecular biology, protein structure-function, and specific metabolic processes. This class is open to senior undergraduate students and the number of places in the class is limited. Priority for enrolment is given to undergraduate students for whom this is a required class for their degree program. Graduate students may select their 2 lab modules from any section or sections, subject to availability of space. Students may not necessarily be assigned to the modules of their first choice but every effort will be made to accommodate those needing the techniques provided in a specific module. Students must obtain a class outline from the Biochemistry & Molecular Biology Office prior to registration and attend the organizational meeting, the date of which will be indicated in the Registration Timetable.
COORDINATOR(S): P. Liu and L. Murray
INSTRUCTOR(S): Biochemistry & Molecular Biology, and Microbiology & Immunology faculty members
FORMAT: Laboratory (48 hours total) and 9 hours of tutorial/computer assignments.
PREREQUISITE: Consent of coordinator

BIOC 5610.06: Scientific Writing and Advanced Laboratory in Biochemical Techniques.

This class will consist of a series of laboratory modules (3 modules each of 4 weeks' duration, 1 day per week or 72 hours in total with limited flexibility to accommodate the need to attend other classes) and tutorials with computer-based assignments designed to teach scientific writing techniques (9 hours in total). The class is organized collaboratively by the Departments of Biochemistry & Molecular Biology, and Microbiology & Immunology. A choice of modules will be offered in 3 sections covering techniques used in the study of molecular biology, protein structure-function, and specific metabolic processes. This class is open to senior undergraduate students and the number of places in the class is limited. Priority for enrolment is given to undergraduates for whom this is a required component of their degree program. Graduate students may select their 3 lab modules from any section or sections, subject to availability of space. Students may not necessarily be assigned to a module of their first choice but every effort is made to accommodate those needing techniques provided by a specific module. Students must obtain a class outline from the Biochemistry & Molecular Biology Department office prior to registration and attend the organizational meeting, the date of which will be indicated in the Registration Timetable.
COORDINATOR(S): P. Liu and L. Murray.
NOTE: BIOC 5603.03 and MICI 5602.03 is equivalent to BIOC 5610.06
INSTRUCTOR(S): Biochemistry & Molecular Biology, and Microbiology & Immunology faculty members.
FORMAT: Twelve 6-hour labs and three 3-hour tutorials/computer assignments.
PREREQUISITE: Consent of coordinator.

BIOC 5700.03: Proteins.

The theme of this class is the relationship between the structure and function of the most versatile class of biological macromolecules. The role of the sequence of monomeric units in the kinetic and thermo-dynamic determination of the protein fold is explored, and methods to determine that three-dimensional fold, and to modify it for experimental or practical purposes considered. Specific details of how form determines function in the proteins' role in binding other molecules both small and large, in membranes, and in energy transduction will be provided. This class will also examine the ways for orderly elimination of superannuated proteins, and how the present variety of form has evolved from primeval origins. In addition to lectures, students independently research specialized topics suggested by the instructor and occasionally present these to the class in discussion group format.
INSTRUCTOR(S): C.J.A. Wallace
FORMAT: Lecture 3 hours
PREREQUISITE: BIOC 3200, plus CHEM 2301 and 2302 or CHEM 2303, or instructor's consent

BIOC 5701.03: Enzymes.

Fundamental principles of enzyme catalysis and its regulation are examined. Use of tools such as steady-state and presteady-state kinetics, isotope effect measurements, site-directed mutagenesis, spectroscopy, X-ray crystallography, and mechanism-based inhibitors to study the architecture and mechanism of action of enzyme active sites are presented. The catalytic mechanism and transition state stabilization are considered in detail for selected enzymes that have been well-characterized structurally. Classic and current papers in the literature are reviewed so that the experimental and conceptual approaches used may be critically appraised.
INSTRUCTOR(S): S.L. Bearne
FORMAT: Lecture 3 hours, problem sets, essay, and seminar
PREREQUISITE: BIOC 3200.03 (grade of B or higher) CHEM 2301.03 and 2302.03 or CHEM 2303.03 (Grade of B or higher) and CHEM 3601.03 or instructor's consent

BIOC 5811.03: Biochemistry of Clinical Disorders I.

This class is an introduction to the pathophysiology of disease. It provides the clinical and biochemical background to disease groups and system disorders and the laboratory approach to their diagnosis. Topics include cardiovascular, renal, gastrointestinal and hepatobiliary disorders, in addition to acid-base, blood and immune abnormalities. Students should contact the Department of Pathology to obtain information on this class.
INSTRUCTOR(S): TBA
FORMAT: Lecture 3 hours, case studies and assignments

BIOC 5812.03: Biochemistry of Clinical Disorders II.

This class is an introduction to the pathophysiology of disease. It uses the same approach as BIOC 5811.03 but different groups of diseases are discussed. Topics include carbohydrate, lipid and amino acid disorders; endocrine and rheumatological diseases, as well as tumor markers and toxicology. Students should contact the Department of Pathology to obtain information on this class.
INSTRUCTOR(S): TBA
FORMAT: Lecture 3 hours, case studies and assignments

BIOC 5910.06: 5913.06: Biochemistry and Molecular Biology Seminar.

Through regular meetings with Faculty members, this class provides students with experience in the written and oral presentation of scientific data. It is divided into three sections, each focused on a different aspect of scientific communication. (1) The first section teaches scientific writing techniques through the use of computer-based assignments. (2) The second section focuses on the development of presentation skills for scientific seminars and posters. Two formal lectures will be presented that emphasize the "art" of scientific communication. Students will prepare 10 min mock Honors presentations that will be presented and critiqued in class. These presentations will then be modified by the students and subsequently presented to the undergraduate Honors students. (3) This final section aims to apply and hone presentation skills learned in sections one and two of the course through the presentation of a mini-symposium by course participants. Students select a scientific topic of their choice and prepare individual presentations (specific guidelines for topic selection will be provided). After 3 or 4 practice sessions in which the students critique one another's presentations, a day-long symposium is given to the department and faculty, with each student presentation being ~ 30 minutes in length and including a short question period. Emphasis is placed on the clarity of presentations and the ability of students to discuss their topic in general terms.
INSTRUCTOR(S): J.M. Archibald (coordinator), S.L. Bearne and M.J. Dobson
FORMAT: Tutorial 1.5 hours, presentations by arrangement

BIOC 9000.06: MSc Thesis.

BIOC 9530.06: PhD Thesis.

Bioethics

Location: Clinical Research Centre
5849 University Avenue
Halifax, NS B3H 4H7
Telephone: (902) 494-3801
Fax: (902) 494-3865
Website: www.bioethics.dal.ca

Department Head

Frank, B., BA, B.Ed, M.Ed. (Acadia), PhD (Dalhousie)

Professors

Baylis, F., BA (McGill), MA, PhD (Western). Cross-appointment with the Department of Philosophy. Canada Research Chair in Bioethics and Philosophy. Interests: novel technologies (in genetics and in neuroscience), research involving humans, women's health and feminist ethics.

Kenny, N., BA (Mount St. Vincent), MD (Dalhousie), FRCPC. Interests: physician ethics, ethics and health policy, and pediatric ethics.

Associate Professors

Fernandez, C., BSc (University of Western Ontario), MD (McMaster). Associate Professor of pediatric hematology/oncology at the IWK Health Centre and Dalhousie University with a cross-appointment in the Department of Bioethics. Interests: Bioethics in pediatric research including return of research results to research participants, complementary and alternative cancer therapies, Wilms tumor.

Graham, J., BA (Waterloo), MA (Victoria), PhD (Montreal). Canada Research Chair in Bioethics. Interests: medical anthropology and science studies; regulation of pharmaceuticals, biologics and genetic therapies; integrative approaches to anthropology and epidemiology; methodologies to assess diagnostic and therapeutics practices; dementia diagnostics and normal aging.

Robinson, W., BA (Princeton), MD (Emory), MPH (Harvard). Associate Professor of the Respiratory Division at the IWK Health Centre and Dalhousie University with a cross appointment in the Department of Bioethics.

Assistant Professors

Kirby. J., MA, MD (Dalhousie). Interests: clinical/organizational ethics, meso-level health care policy, mental health ethics and social/disability justice.

Reid, L., BA (Winnipeg), AM and PhD (Illinois). Interests: research ethics, interdisciplinary models of ethics education, medicine and social responsibility, ethics and neurosciences, history and conceptualization of somatic education, experience, epistemology, and social construction of chronic pain.

Simpson, C., BA&Sc (McMaster), MA (McMaster), PhD (Dalhousie). Interests: the role of hope in health care, ethics education and capacity building, rural bioethics and organizational ethics.

I. Classes offered

NOTE: The classes listed are half year classes, and may not be offered every year. Instructors are likely to vary from year to year. Consult the department for further information.

BIOT 5000.03: Advanced Topics in Bioethics.

The seminar involves critical examination of the bioethics literature. The application of various methodologies utilized in contemporary bioethical analysis will be highlighted. It will be of interest to graduate students in medicine, health professions, health law, and philosophy whose thesis topic involves a substantial bioethical component.
INSTRUCTOR(S): F. Baylis, N. Kenny, J. Graham
FORMAT: Seminar, Reading Course
PREREQUISITE: Instructor Permission

BIOT 5001.03: Research Ethics.

This seminar involves critical examination of the research ethics literature, with particular attention to a range of topics including: informed consent; research involving specific groups/communities; risks/limits to allowable risks; emergency room research; and placebo controls. It will be of interest to graduate students in medicine, health professions, health law, and philosophy.
INSTRUCTOR(S): TBA
FORMAT: Seminar
PREREQUISITE: Permission of the instructor

BIOT 5002.03: Health Care Ethics and the Law.

The purpose of this class is to develop an understanding of health law and health care ethics and of the relationship between law and ethics. Topics covered in the past years include: informed choice; death and dying; genetics; reproduction; HIV and AIDS; resource allocation; and health research. Each issue is examined in an effort to determine what the law is and what the law ought to be.
CROSS-LISTING: LAW 2115.03

BIOT 5101.03: Directed Readings in Bioethics I.

This is an advanced level directed reading course designed for graduate students. Instructors and topics can vary.
PREREQUISITE: Permission of the instructor

BIOT 5102.03: Directed Readings in Bioethics II.

This is an advanced level directed reading course designed for graduate students. Instructors and topics can vary.
INSTRUCTOR(S): Permission of the instructor

BIOT 5801.03: Topics in Health Care Ethics: Theories and Methods in Health Care Ethics.

In this class, we will explore some of the current debates among different theoretical perspectives about the proper theoretical groundwork for bioethics and the methodologies associated with these diverse theories. We shall pay particular attention to canonical work in the field, such as the principles approach of Beauchamp and Childress, while examining feminist and other alternatives. We shall consider the ways different theories identify, frame, and reason about ethical questions that arise in the realm of health and health care.
INSTRUCTOR(S): S. Sherwin
FORMAT: Seminar
CROSS-LISTING: PHIL 5801.03

BIOT 6002.03: Foundations of Applied Health Research.

This class will acquaint students with the ethical basis of health research, as well as the substantive issues that arise at the macro, meso and micro levels in the design and conduct of research. A variety of approaches to ethical decision making will be surveyed, with particular attention given to how various approaches might apply in the context of Atlantic Canada. Standard topics will be explored in this course such as informed consent, privacy and confidentiality of health information, and conflicts of interest. Special attention will be given to issues of rural/urban split, respect for the integrity of communities, and the potential abuse of expert or professional authority.
INSTRUCTOR(S): N. Kenny
FORMAT: WebCT course
CROSS-LISTING: ARTC 6002.03

BIOT 6045.03: Qualitative Methods in Health Research.

This advanced course in community research introduces students to social theory and qualitative methodologies and techniques. The articulation of appropriate methods to address theoretical, epistemological and practical issues is emphasized. Students will develop a theoretically sound rationale for their proposed research and gain experience in data collection, fieldwork, and analysis.
INSTRUCTOR(S): J. Graham
FORMAT: Seminar
PREREQUISITE: Graduate student status and permission of instructor
CROSS-LISTING: CH&E 6045.03

Biology

Location: Life Sciences Centre
1355 Oxford Street
Halifax, NS B3H 4J1
Telephone: (902) 494-3515
Fax: (902) 494-3736

Chair
MacRae, T.H.

Graduate Coordinator
Whitehead, H.

Graduate Admissions
Walde, S.

Professors Emeriti
Hall, B.K., PhD, DSc (UNE), FRSC, University Research Professor Emeritus

McLaren, I.A., MSc (McGill), PhD (Yale), George S. Campbell Professor Emeritus. Copepod growth rules; population biology; copepods; birds; seals.

Vining, L.C., MSc (Auck), PhD (Cantab), FRSC. Antibiotics, resistance, biosynthesis, microorganisms, molecular mechanisms, biotechnology, antibiotic production, secondary metabolism.

von Maltzhan, K.E., MS, PhD (Yale)

Professors
Adamo, S., BSc (Toronto), PhD (McGill). Major appointment in Psychology. Insect and cephalopod behavioural physiology.

Bentzen, P., MSc (UBC), PhD (McGill) DFO Professor, Fisheries Resource Conservation Genetics and Biotechnology. Population genetics, conservation genetics, evolutionary genetics, fish ecology, fisheries science.

Croll, R., PhD (McGill), major appointment in Physiology/ Biophysics. Molluscan neurobiology, development and reproduction.

Fentress, J.C., PhD (Cantab), major appointment in Psychology. Behavior in mammals, rodents, wolves.

Freedman, B., MSc, PhD (Toronto). Pollution, disturbance, forest harvesting, wildlife, biodiversity, conservation, urban ecology, ecologial carbon credits.

Hutchings, J., MSc, PhD (Memorial). Evolutionary ecology of fishes, life history evolution, salmonid fish, population biology, commercially exploited fishes, reproductive strategies, marine conservation biology.

Iverson, S.J., PhD (Maryland),WFA. Reproductive strategies in mammals, lactation and energetics lipid metabolism, fatty acids, diets in marine mammals.

Johnston, M.O., PhD (Chic). Evolutionary genetics, plant evolution, plant ecology, mutations and evolution, molecular evolution, plant reproduction, evolution of self-fertilization, inbreeding depression, speciation, floral development, sex allocation in hermaphroditic animals.

Lane, P.A., MSc (SUNY Binghamptom), PhD (SUNY Albany). environment-economy interaction, ecosystem health, environmental management, sustainability in Cuba, water pollution, freshwater and marine ecosystems, food web analysis.

Lee, R.W., MA (Mass), PhD (SUNY Stony Brook). Mitochondrial genetic systems, green algae, Chlamydomonas,mitochondrial ribosomal RNA coding regions, mitochondrial gene sequences, mitochondrial ribosomes, recombination of mitochondrial DNA.

Leonard, M.L., PhD (Ottawa). Behavioral ecology, parent-offspring interactions, conservation, avian communication and conservation.

MacRae, T.H., MSc, PhD (Windsor). Cell/molecular biology, small heat shock protein, molecular chaperone, tubulin gene expression, gamma-tubulin, microtubule organization, cytoskeleton, , embryo development.

Meinertzhagen, I.A., PhD, DSc (St Andrews), Killam Professor in Neuroscience, major appointment in Psychology. Visual system in flies, *Drosophilia*, synapse formation, computer 3-D construction techniques, circadian rhythms , cell lineage, neurons in ascidian tadpole larva, evolution of all of these.

O'Dor, R.K., PhD (UBC). Energy costs, marine animals, cephalopods, planktonic bivalve larvae, Nautilus, squid, cuttlefish and octopus, acoustic telemetry.

Patriquin, D.G., MSc, PhD (McGill). Agroecology, seagrasses, nutrient cycling, Web literacy.

Pohajdak, B., MSc, PhD (Man). Molecular immunology, (NK) cells, tumors, cloning techniques, immunocontraception vaccines, transgenic fish, insulin.

Scheibling, R.E., BSc, PhD (McGill). Community ecology, marine rocky intertidal, subtidal zones, disturbance, succession, community structure, larval settlement, benthic marine invertebrates, predator-prey interactions, behavioral ecology, population dynamics, sea urchins.

Shaw, S.R., BSc (London), PhD (St Andrews), major appointment in Psychology. Insect sensory neurobiology; nervous system evolution; blood-brain barrier; visual and acoustic coding.

Stoltz, D.B., PhD (McMaster), major appointment in Microbiology. Polydnaviruses; parasitism in insects; honeybee viruses.

Walde, S.J., PhD (Calgary). Stream ecology, predator-prey interactions, arthropod populations, dispersal, competition.

Wassersug, R.J., PhD (Chic), major appointment in Anatomy and Neurobiology. Functional morphology; amphibian larvae; vertebrate adaptations; development; evolution.

Whitehead, H., MA, PhD (Cambridge). Behaviour, ecology, population biology of whales, social structure in vertebrates.

Willison, J.H.M., PhD (Nottingham). Biodiversity conservation, biodiversity monitoring protocols, urban ecology, marine protected areas, protected areas systems.

Wright, J.M., PhD (Memorial). Gene expression, eukaryotic genomes, genetics, fish cytogenetics.

Associate Professors
Adl, S.M., MSc (UBC), PhD (UBC, Paris-VI). Soil ecology, sustainable soil management, microbial ecology, protistology, comparative cell biology.

Herbinger, C.M., PhD (Dal). Tree breeding, population, conservation and quantitative genetics of aquatic organisms, aquaculture.

Latta, R., MSc (Toronto), PhD (Colorado). Ecology and Evolution of Plants. Spatial genetic structure of populations, migration and gene flow, adaptation to local environments, natural selection.

Pinder, A. PhD (Mass), NSERC Research Fellow. Respiration, circulation, metabolism in amphibians and fish, cardiovascular system, oxygen transport, gas exchange, microcirculation, environmental physiology, amphibians, hypoxia, blood flow.

Ruzzante, D.E., PhD (Dal). Associate Professor and CRC in Marine Conservation Genetics. Population and conservation genetics of aquatic organisms. Adaptive radiation in fish.

Staicer, C.A., MSc (Northern Arizona), PhD (U Mass Amherst). Ecology and behaviour of birds, forest ecosystem and biodiversity monitoring.

Assistant Professors
Bielawski, J.P., PhD (Texas A & M University). Adaptive molecular evolution, adaptation and diversification in prokaryotes, molecular phylogenetics, genomics, bioinformatics.

Côté, P.D., BSc (Ottawa), PhD (McGill). Cellular neurobiology, molecular genetics, neural development, retina maturation, synaptogenesis, sodium channels.

Gunawardena, A., BSc (Srilanka), PhD (Oxford). Plant developmental biology, plant cell biology, proogrammed cell death, caspases, ethylene.

Lotze, H.K., BSc (Gottingen), MSc, PhD (Kiel). Marine resources, population and community ecology, human impacts, cumulative effects, ecosystem structure and functioning, biodiversity, ecological history, management and conservation.

Romanuk, T.N., PhD (McMaster). Food web structure and function, aquatic microcosms, stability, network theory, biodiversity.
Simpson, A.G.B., BSc, PhD (Sydney Australia). Early Eukaryote Evolution: biodiversity and systematics of eukaryotic microbes (protists; protozoa), sub-cellular morphology of protists, molecular phylogenetics, genome evolution, classification.
Stone, S.L., BSc, PhD (York University). Plant development, molecular biology, proteomics, ubiquitination, regulated proteolysis, molecular genetics of seedling development, abiotic stress tolerance.
Worm, B., PhD (Kiel, Germany). Marine biodiversity science, biodiversity-ecosystem linkages, marine conservation ecology, experimental community ecology of rocky shores, fisheries ecology, human impacts on marine ecosystems.

Adjunct Professors

Barber, C., PhD (Queen's), SMU
Bowen, W.D., PhD (UBC), BIO
Bricelj, M., PhD (State U, New York), NRC
Brown, L., BSc (McGill), MSc (Simon Fraser), PhD (UBC.)
Campana, S.E., PhD (UBC), BIO
Cone, D.K., MSc (Guelph), PhD (UNB), SMU
Dong, Z., PhD (Ottawa), SMU
Douglas, S.E., MSc, PhD (Dal)
Ewart, V., PhD (Memorial), NRC
Hanson, M., BSc, MSc (Ottawa), PhD (McGill)
Hatcher, B.G., BSc, MSc (Dal), PhD (Aus), Marine ecosystem ecology, Coral reef ecology, Tropical fisheries, Marine management.
Harrison, W.G., PhD (New York at Stony Brook)
Johnson, S., BSc, MSc (Dal), PhD (Simon Fraser)
Kenchington, E., MSc (Dal), PhD (Tasmania), BIO
Lall, S., BSc (India), MSc, PhD (Guelph)
Lloyd, V., BSc, MSc (Geneva). PLD (UBC)
Olivier, G., BSc, MSc, PhD (Montreal)
Platt, T.C., MA (Toronto), PhD (Dal), FRS, BIO
Ross, N., BSc, PhD (McGill)
Swain, D.P., PhD (UBC)
Vessey, K., BSc, MSc (Dal), PhD (Queen's)
Vezina, A., BSc (Laval), PhD (McGill)
Warman, P.R., BSc (Rutgers), MSc, PhD (Guelph)
Witton, P.E., PhD (Hamburg)

Adjunct Research Associates

Chapman, L., PhD (Hamburg)
Horn, A., BSc (Cornell), PhD (Univ. of Toronto)
Weilgart, L., BA (Luther), MSc (Memorial), PhD (Dal)

I. Admission

The Biology Department has facilities for advanced study and research leading to the MSc and PhD degrees.

Candidates must satisfy the general requirements for admission to the Faculty of Graduate Studies and normally a student will not be permitted to earn all three degrees (BSc, MSc, and PhD) at Dalhousie. All inquiries for admission to the graduate program should be addressed to Julie Walker, Biology Department.

II. Degree Options

A. MSc Degree Program

Students are required to take at least two full credits at the graduate level including Biology 5700.03 and Biology 5705.03; they may include graduate classes from other departments or the Nova Scotia Agricultural College. Additional classes may be specified by supervisory committees.

Students are required to demonstrate in an undergraduate biology class for at least one year and must take an admission to candidacy examination during the first nine months.

A thesis reporting original research must be submitted and defended orally.

Students are expected to participate in weekly departmental seminars.

B. PhD Degree Program

Students without MSc degrees have the same course requirement as MSc students. Students with MSc degrees must take at least one full credit at the graduate level. Additional classes may be taken. Students are required to demonstrate in an undergraduate biology class for one year, and must take an admission to candidacy exam in their first nine months.

A preliminary examination including a review paper and thesis progress report is required for all PhD students. Students must pass the preliminary examination at least one year before submitting a PhD thesis.

A thesis reporting original research must be defended orally. Students are expected to participate in weekly departmental seminars.

Ancillary and Audit Classes

At the discretion of the Supervisory Committee, Supervisor or ATC examiners, a student may be directed to take for credit classes needed to make up deficiencies or acquire skills considered beneficial but of subsidiary importance. If these are undergraduate level classes they are designated as ancillary, to be passed with a minimum grade of D. They must be reported to the Graduate Coordinator or Stream Chair at the interview in September. They may ***not*** be used for ***graduate credit***.

Students may also elect or be required to audit classes relevant to their program. No credits are received for these. A maximum of one audit class is allowed for each year of the specified program (i.e. One for a 1-year MSc, two for a 2-year MSc, etc.). Continuing Students may not audit. However, additional classes may always be audited if paid for with extra fees.

III. Streams

The graduate program in Biology is organized in three "streams", representing broad subdivisions of the discipline. Each student must elect to belong to one of these.

Stream A: Ecology and Evolution
Stream C: Cellular & Molecular Biology
Stream D: Organismal Biology

Class Selection

Classes with the extension.03 are half-credit classes. All others (sometimes shown with the extension.06) are one-credit classes.

Some classes are given only in alternate years. Others are suspended due to sabbatical leaves but will resume when the staff return. All class offerings are included in this listing so that students may plan their entire class in their first year. Such planning is necessary because the Faculty of Graduate Studies requires that a complete program be prepared for each student by October 15th in their first year.

IV. Required Classes for MSc Students

BIOL 5700.03: Communication Skills.

Scientists must be able to communicate with other scientists in a variety of spoken and written formats. Communication with the public via the mass media is increasingly important in many science jobs. Through realistic, practical assignments students will be able to test and develop their communication skills. There will also be some consideration of other aspects of the work of a biologist (e.g. ethics).
This class will be given mostly in the Fall term and is graded pass/fail.
NOTE: Required of all MSc students.
INSTRUCTOR(S): S. Iverson
FORMAT: Two hours/week 1:30 p.m. - 3:30 p.m. Fridays

BIOL 5705.03/5706.03: Graduate Module Classes.

All MSc students must complete a module class. All students choose from the same set of modules. Three month-long modules (out of about 15-20) are required for each half credit. Students who have taken BIOL 5705.03 may take BIOL 5706.03. Both classes are graded. Modules may also be offered at the Nova Scotia Agricultural College (NSAC) in Truro. Their titles will be listed on the module bulletin board.
COORDINATOR: J.P. Bielawski

V. Summary of Class Offerings

Related to Stream A
BIOL 5033.03: Molecular Genetic Techniques in Ecology
BIOL 5042.03: Marine Conservation Genetics
BIOL 5060.03: Environmental Ecology
BIOL 5061.03: Experimental Design in Biology (not offered in 2006/07)
BIOL 5062.03: Analysis of Biological Data
BIOL 5063.03: Biological Modelling
BIOL 5065.03: Sustainability and Global Change
BIOL 5067.03: Ecology and Evolution of Fishes
BIOL 5160.03: Political Ecology
BIOL 5214.03: Physiology and Biochemistry of Marine Algae
BIOL 5261.03: Communities and Ecosystems
BIOL 5616.03: Ecosystem Analysis
BIOL 5651.03: Marine Mammalogy

Related to Stream C
BIOL 5012.03: Advanced Laboratory in Biochemical Techniques
BIOL 5020.03: Comparative Cell Biology
BIOL 5044.03: Genetics in Ecology
BIOL 5101.03: Industrial Microbiology and Biochemistry
BIOL 5105.03: Medical Biotechnology I
BIOL 5610.06: Advanced Laboratory in Biochemical Techniques

Related to Stream D
BIOL 5070.03: Advanced Topics in Animal Physiology
BIOL 5074.03: Introduction to Animal Nutrition
BIOL 5075.03: Nutrition in Aquaculture
BIOL 5101.03: Industrial Microbiology and Biochemistry
BIOL 5103.03: Infectious Diseases of Aquatic Organisms
BIOL 5105.03: Medical Biotechnology I

The following graduate classes are normally given at the Nova Scotia Agricultural College. Phone Jill Rogers (1 (902) 893-6360) for more information.

Regular Classes

AGRI 5270: Economic Entomology
AGRI 5350: Animal Research Methods
AGRI 5360: Protein Nutrition
AGRI 5380: Quantitative Genetics
AGRI 5390: Molecular Genetic Analysis of Populations
AGRI 5520: Plant Breeding Methods
AGRI 5530: Nitrogen in Crop Production
AGRI 5560: Advanced Crop Physiology
AGRI 5700: Communication Skills & Graduate Seminar
AGRI 5705: Module Class II
AGRI 5710: Module Class
AGRI 5720: Applied Statistics & Experimental Design for Agriculture
AGRI 5740: Advanced Studies in Food Chemistry
AGRI 9000: Graduate Thesis

Special Topic Classes

AGRI 5210: Special Topics in Environmental Microbiology
AGRI 5220: Special Topics in Weed Science
AGRI 5240: Special Topics in Environmental Impact
AGRI 5260: Special Topics in Plant Pathology
AGRI 5310: Special Topics in Applied Ethology
AGRI 5340: Special Topics in Animal Physiology
AGRI 5370: Special Topics in Animal Breeding and Genetics
AGRI 5410: Special Topics in Soil Fertility
AGRI 5430: Special Topics in Environmental Analysis
AGRI 5440: Organic Environmental Analysis (CS420)
AGRI 5460: Special Topics in Soil and Water Management
AGRI 5470: Special Topics in Analytical Instrumentation for Researchers
AGRI 5510: Special Topics in Plant Breeding
AGRI 5540: Special Topics in Crop Physiology
AGRI 5570: Special Topics in Agricultural Biotechnology
AGRI 5610: Special Topics in Animal Product Technology

Cross-Referenced Classes

Cross references with undergraduate classes are shown in brackets ( ).

AGRI 5250: Soil Microbiology (MICR 4000)
AGRI 5450: Environmental Soil Chemistry (SOIL 4000)
AGRI 5620: Ruminant Digestive Physiology & Metabolism (NUTR 4000)
AGRI 5630: Intermediate Statistical Methods (STAT 4000)
AGRI 5750: Biotechnology (GENE 4003)

VI. Class Descriptions

BIOL 5012.03: Advanced Laboratory in Biochemical Techniques.

This class will consist of 3 laboratory modules (each of 4 weeks duration, 6 hours per week) organized collaboratively by the departments of Biochemistry, Biology and Microbiology. A choice of modules will be offered in 3 sections covering techniques used in the study of molecular biology, protein structure-function, and specific metabolic processes. Graduate students may select their 3 modules from any section or sections, subject to availability of space. This class is open to senior undergraduate students and the number of places in the class is limited. If necessary, priority for enrollment will be given to undergraduate students for whom this is a required class for their degree program. Students may not necessarily be assigned to the modules of their first choice but every effort will be made to accommodate those needing the techniques provided in a specific module or who have to meet distribution requirements among the three sections.
Students must obtain a class outline from the Biochemistry Office prior to registration and return the module selection form at least 2 hours prior to the organizational meeting, the date of which will be indicated in the Registration Timetable.
COORDINATOR: H.-S. Ro
INSTRUCTOR(S): J. Ro and J.M. Wright
FORMAT: Laboratory, approximately 72 hours total
CROSS-LISTING: BIOC 4603.03/5603.03, BIOL 4012.03, MICI 4601.03/5601.03

BIOL 5033.03: Molecular Genetic Techniques in Ecology.

This course provides training in methods of DNA analysis applicable to ecological and behavioral studies. Techniques covered include DNA isolation, gel electrophoresis, PCR, DNA sequencing, and microsatellite and amplified fragment polymorphism (AFLP) analysis. In addition to pre-planned exercises aimed at building skills in basic techniques, student will also do a mini-research project.
FORMAT: Lab
PREREQUISITE: Molecular Ecology or Marine Conservation Genetics

BIOL 5042.03: Marine Conservation Genetics.

This class will introduce students to current approaches to understanding genetic structure and phyloegraphy of aquatic organisms with emphasis on marine species. Attention will be given to problems in interpreting structure and its biological significance, and on current efforts to disentangle the roles of gene flow, selection and historical contingency.
NOTE: Graduate students will do an essay not required of undergraduate students (BIOL 4042)
INSTRUCTOR(S): Bentzen, Dr. P., Ruzzante, Dr. D.
FORMAT: Lectures, student presentations, group discussions, 3 hours
PREREQUISITE: BIOL 2060, BIOL 2030 or BIOC 2030
CROSS-LISTING: BIOL 4042

BIOL 5044.03: Genetics in Ecology.

The interface between heritable variation among living things (genetics) and their interactions with their environment (ecology) is the fundamental crucible of adaptive evolutionary change. This class will present an advanced examination of genetic variation in ecologically important traits. Both single gene and continuously varying (quantitative) traits will be examined.
INSTRUCTOR(S): R.G. Latta
FORMAT: Lecture/seminar
PREREQUISITE: BIOL 3041.03 and STAT 2080.03
CROSS-LISTING: BIOL 4044.03

BIOL 5060.03: Environmental Ecology.

Various topics within the field of Environmental Ecology are discussed. Emphasis is on the organism and/or ecosystem effects of forestry practices and other types of land management, including recreation. The effects of various types of pollutants, including acid precipitation, oil spills, heavy metals, sulphur dioxide, and chemical pesticides will be considered. The class format is discussion-type seminars plus presentations by students.
INSTRUCTOR(S): B. Freedman
FORMAT: Lecture/tutorial, 3 hours
PREREQUISITE: None
CROSS-LISTING: BIOL 3060.03

BIOL 5061.03: Experimental Design in Biology.

The purpose of this class is to introduce students who have previously taken formal classes in statistics to the practice and pitfalls of experimental design and data analysis in Biology. Using many real examples, especially from the ecological literature, we will show how experiments should be designed and analyzed in different situations, with emphasis on potential problems and how they may be overcome
INSTRUCTOR(S): R. Scheibling
FORMAT: Lecture, 3 hours
CROSS-LISTING: BIOL 4061.03

BIOL 5065.03: Sustainability and Global Change.

Sustainability Development has become a universal concept embraced by both the North and South. This class examines how it has been used in various applications and its central role in development thinking in a world undergoing rapid change.
INSTRUCTOR(S): Lane, Patricia A.
FORMAT: 3 hr lecture and discussion, Web CT
PREREQUISITE: One 3000 level Ecology or IDS class or permission of instructor
CROSS-LISTING: BIOL 4065.03

BIOL 5067.03: Ecology and Evolution of Fishes.

This class will examine selected topics on the ecology and evolution of marine and freshwater fishes. Topics shall include systematics, morphology, evolutionary ecology, behavior, life history strategies, population biology, and fisheries management.
INSTRUCTOR(S): J. Hutchings
FORMAT: Lecture 3 hours, lab 2.5 hours
PREREQUISITE: BIOL 2001.03, BIOL 2060.03
CROSS-LISTING: BIOL 3067.03

BIOL 5070.03: Advanced Topics in Animal Physiology.

Whereas the introductory animal physiology classes emphasize common principles, this class emphasizes the diversity of physiological solutions to common problems among animals. A different problem is chosen each year and each student presents two seminars reviewing the literature of particular animals' solutions. The student also writes a short term paper base don one of their presentations.
INSTRUCTOR(S): A. Pindor, R.K. O'Dor
FORMAT: Lecture, 2 hours; open lab
PREREQUISITE: Classes in organic chemistry, general biochemistry, physiology and plant biology normally necessary. Permission of instructor required
CROSS-LISTING: BIOL 4070.03

BIOL 5074.03: Introduction to Animal Nutrition.

Subject matter will include an introduction to the history of nutritional sciences, nutrition research techniques, and focus on lipid, carbohydrate and protein requirements. Topics also will include livestock and companion animal nutritional needs as well as those of a few exotics.
INSTRUCTOR(S): N. McAllister-Irwin
PREREQUISITE: Permission of instructor
CROSS-LISTING: BIOL 4074.03

BIOL 5101.03: Industrial Microbiology and Biochemistry.

A lecture and assignment class on the chemical, physical and biological aspect, of industrial processes. Assignments include problem-solving, proposal and report writing, and oral presentations.
INSTRUCTOR(S): M. Silver
FORMAT: Lecture/seminar 2 hours

BIOL 5103.03: Infectious Diseases of Aquatic Organisms.

This class will examine a variety of pathogens (viral, bacterial, fungal and protozoan) with emphasis on disease prevalence, diagnosis, control and pathogen identification. Immune systems of invertebrates and vertebrates will be discussed in relation to disease.
FORMAT: Lecture 3 hours
CROSS-LISTING: BIOL 4012.03

BIOL 5105.03: Medical Biotechnology I.

This class covers the fundamental principles of biotechnology from a medical perspective. Topics covered will include: recombinant DNA technology, polymerase-chain reaction based applications, immunochemical techniques and applications, cell and tissue culture, and business and legal aspects of biotechnology.
INSTRUCTOR(S): M.J. Dobson
FORMAT: Lecture, discussions and presentations
PREREQUISITE: BIOC 3200.03, 3300.03, and 3400.03 and MICI 3115.03 or consent of instructor
CROSS-LISTING: BIOC 4501.03

BIOL 5160.03: Political Ecology.

Political ecology examines the politics, in the broadest sense of the word, of the environment. How do existing and planned policies affect the use of environment by society? Political ecology does not center on specific policies or political processes or ideologies; it considers an array of broad political, and socio-economic forces that shape the human relationship to the environment. These forces are multiple and interact in complex ways.
INSTRUCTOR(S): Lane, Patricia A.
FORMAT: 3 hr Discussion + Web CT
PREREQUISITE: One 3000-level class in Ecology or IDS or consent of instructor
CROSS-LISTING: BIOL 4160.03

BIOL 5214.03: Physiology and Biochemistry of Marine Algae.

Algae are examined in terms of their major processes and products with attention directed toward the influence of environmental factors, such as light, nutrition and temperature. The taxonomic classes are compared by means of pigment composition, nitrogenous compounds, reserve products and cell wall structure. Students will be expected to search the literature on specific topics and present verbal or written reports.
INSTRUCTOR(S): A. Cembella and J.S. Craigie
FORMAT: Lecture, 2 hours

BIOL 5261.03: Communities and Ecosystems.

This Web CT class is divided into two parts. The first deals with the history and theory of natural communities and ecosystems. The second covers human interactions with ecosystems, ecosystem health, ecosystem integrity, environmental assessment, environmental management planning, ecological footprint, and related applied ecosystem issues.
INSTRUCTOR(S): Lane, Patricia A.
FORMAT: 3 hr lecture + Web CT
PREREQUISITE: Introductory Ecology or IDS, or permission of instructor
CROSS-LISTING: BIOL 3061.03

BIOL 5610X/Y.06: Scientific Writing and Advanced Laboratory in Biochemical Techniques.

This class will consist of a series of laboratory modules (3 modules each of 4 weeks' duration, 1 day per week or 72 hours in total with limited flexibility to accommodate the need to attend other classes) and tutorials with computer-based assignments designed to teach scientific writing techniques (9 hours in total). The class is organized collaboratively by the

Departments of Biochemistry & Molecular Biology, Biology, and Microbiology & Immunology. Several lab modules will be offered in 3 sections covering techniques used in the study of molecular biology, protein structure-function, and specific metabolic processes. Students in concentrated Honors Biochemistry must complete 1 module from each section. Students in combined Honors with Biochemistry may select their three modules from any section or sections, subject to availability of space. Students must obtain a class outline from the Biochemistry & Molecular Biology Department office prior to registration and return the module selection form at least 24 hours prior to the organizational meeting, the date of which will be indicated in the Registration Timetable.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): Faculty members of the departments of Biochemistry & Molecular Biology, Biology, and Microbiology & Immunology.
FORMAT: Twelve 6-hour labs and three 3-hour tutorials/computer assignments.
CROSS-LISTING: BIOC 4610.06, BIOC 5610.06. BIOL 4013X/Y.06, MICI 4610X/Y.06, MICI 5610X/Y.06

BIOL 5701.03: Communication Assignment.

This class is for first year PhD's who have already completed BIOL 5700C, and others by special permission. Permission to register in this class must be obtained by October 15th.
Assignments appropriate to the student's background and interests will be organized to further develop communication skills.
INSTRUCTOR(S): S. Iverson

VII.Special Topics Classes

BIOL 5800-5899: Special Topics and Projects in Biology.

A suitable combination of directed reading, seminars, written assignments, individual study and discussion or laboratory projects in a prescribed area. Classes are organized and scheduled by appropriate faculty, Adjunct Professors or Honorary Research Associates when requested by interested students. Students should approach potential instructors directly with their requests. Each separate topic must be approved by the Graduate Coordinator and is not normally given for students taking a class from their research supervisor. Approval must be requested by the instructor in writing and must have been received before October 1. A class description is required before approval can be given. Classes may be worth a half or full credit, depending upon duration and content.
PREREQUISITE: Permission of the instructor

BIOL 5801.03: Special Topic in Agricultural Biology.

BIOL 5802.03: Special Topic in Animal Behaviour.

BIOL 5803.03: Special Topic in Animal Physiology.

BIOL 5804.03: Special Topic in Animal Science.

BIOL 5805.03: Special Topic in Aquaculture.

BIOL 5806.03: Special Topic in Biochemistry.

BIOL 5807.03: Special Topic in Biological Education.

BIOL 5808.03: Special Topic in Biomathematics.

BIOL 5809.03: Special Topic in Biostatistics.

BIOL 5810.03: Special Topic in Cell Biology.

BIOL 5811.03: Special Topics in Development Biology.

BIOL 5812.03: Special Topic in Ecology.

BIOL 5813.03: Special Topic in Environmental Biology.

BIOL 5814.03: Special Topic in Evolutionary Biology.

BIOL 5815.03: Special Topic in Fish Biology.

BIOL 5816.03: Special Topic in Functional Morphology.

BIOL 5817.03: Special Topic in Genetics.

BIOL 5818.03: Special Topic in History of Biology.

BIOL 5819.03: Special Topic in Industrial Microbiology.

BIOL 5820.03: Special Topic in Limnology.

BIOL 5821.03: Special Topic in Marine Biology.

BIOL 5822.03: Special Topic in Marine Ecology.

BIOL 5823.03: Special Topic in Marine Microbiology.

BIOL 5824.03: Special Topic in Microbiology.

BIOL 5825.03/5925.06: Special Topic in Molecular Biology.

BIOL 5826.03: Special Topic in Philosophy of Biology.

BIOL 5827.03: Special Topic in Phycology.

BIOL 5828.03: Special Topic in Plant Biology.

BIOL 5829.03: Special Topic in Plant Ecology.

BIOL 5830.03: Special Topic in Plant Physiology.

BIOL 5831.03: Special Topic in Plant Science.

BIOL 5832.03: Special Topic in Population Biology.

BIOL 5833.03: Special Topic in Zoology.

BIOL 9000.00: MSc Thesis.

BIOL 9530.00: PhD Thesis.

Biomedical Engineering

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Website: http://bme.medicine.dal.ca/

Interim Director

Kozey, C.L.

Graduate Coordinator

French, A.S.

Professors

Bance, M., MB, ChB (Manchester, England), MSc (Toronto), FRCS (C) (Canada). Middle ear mechanics, measuring minute vibrations of middle ear structures, hearing reconstruction mechanics, design of prosthesis for hearing reconstruction, transfer function of normal and diseased middle ears, finite element modelling of middle ear (in conjunction with Dr. Robert Funnel at McGill University). Primary appointment in Division of Otolaryngology, Faculty of Medicine.

Clements, J.C., PhD (Toronto). Optimal control theory applied to electrocardiography, electrophysiological imaging, reaction-diffusion modeling in synaptic transmission at neuromuscular junctions. Primary appointment in Mathematics & Statistics.

Fine, A., PhD (Univ. of Pennsylvania) VetMD (Univ. of Pennsylvania). Synaptic function and plasticity in the brain. Brain networks underlying sensation and memory. Advanced optical methods for imaging neural structure and function. Primary appointment in Physiology and Biophysics.

French, A., PhD (Essex). Information encoding and processing by sensory neurons, mechanotransduction, nonlinear systems analysis and ion channel biophysics. Primary appointment in Physiology and Biophysics.

Gregson, P., PEng, PhD (TUNS). Image processing; computer vision; computer-assisted pathology detection, localization and quantification in diagnostic imaging. Primary appointment in Electrical and Computer Engineering.

Horacek, M., PhD (Dal). Quantitative cardiac electrophysiology; body surface potential mapping; the inverse problem in electrocardiology and magnetocardiology. Primary appointment in Physiology and Biophysics.

Kirby, L., MD (Dal). The design, safety and performance of assistive technology for people with physical disabilities. In particular, wheelchairs, walking aids and artificial limbs. Primary appointment in Division of Physical Medicine and Rehabilitation, Faculty of Medicine.

Kozey, C., PhD (Dalhousie). Classification of neuromuscular control patterns associated with normal movement and movement in the presence of pathology and/pain. These studies involve the use of electromyography, and other sensors to measure muscle function and motion parameters. Primary appointment in the School of Physiotherapy.

Lee, J. M., PhD (Western). Bioprosthetic heart valves and vascular grafts, intravascular stents, biopolymers, tissue mechanics, developmental changes in cardiovascular system. Primary appointment in Applied Oral Sciences.

Weaver, D.F., MD (Queen's), PhD (Queen's). Computer-aided design and development of new chemical entities as potential drugs for people with neurologic diseases. In particular, epilepsy, Alzheimer's and general anaesthesia. Primary appointment as Tier 1 Canada Research Chair in Dept of Medicine (Division of Neurology), cross-appointment to Dept of Chemistry.

Associate Professors

Filiaggi, M., PhD (Toronto) Biomaterials for orthopaedic and dental applications; synthesis of bioceramic scaffolds and coatings; bone regeneration and replacement. Primary appointment in Applied Oral Sciences.

Ghanem, A., PhD (Cornell). Cell biomaterial interactions, biodegradable biopolymers for tissue engineering and drug delivery, cell culture models for in vitro toxicology. Primary appointment in Chemical Engineering.

Gratzer, P., PhD (Toronto). Tissue engineering. Developing scaffolds for tissue regeneration (e.g. blood vessels, ligaments) using naturally derived materials (collagen and elastin). Primary appointment in School of Biomedical Engineering.

Gu, J., PhD (Alberta). Medical robotic devices and applications; artificial eye implant control; rehabilitation assistive device design and applications; sensor fusion in mobile robot. Primary appointment in Electrical & Computer Engineering.

Horne, G., MD (London), PhD (Calgary). Septal mechanics in heart failure. Non-invasive functional myocardial imaging (echocardiography, MRI, scintigraphy), somatic cell gene therapy for myocardial repair. Primary appointment in Medicine.

Maksym, G., PhD (McGill). Magnetic bead micromanipulation for stimulation and measurement of the cytoskeletal mechanics of the cell; structure-function of airway smooth muscle cells in asthma. Primary appointment in School of Biomedical Engineering.

Price, R.B., PhD (Malmo, Sweden), DDS (Dalhousie University). Photopolymerization of dental resins, hardness testing, cytotoxicity of dental resins, light emitting diode (LED) dental curing lights, optical testing of dental curing lights, mechanical testing of dental materials. Primary Appointment in Dentistry.

Russell, K.A., MSc, Diploma Orthodontics (Toronto), DDS (Dalhousie University). (I) 3-D assessment of cleft lip and palate repair: facial morphometric studies and evaluation of bonegrafting and orthodontic results (II) material properties of orthodontic wire/bracket systems and elatomers. Primary Appointment in Dentistry.

Assistant Professors

Dunbar, M., PhD (Lund), MD (Dalhousie). Joint biomechanics and kinematics. Development of Radiostereometric Analysis and Gait Analysis for Prediction of hip and knee arthroplasty failure. Development of Gait Laboratory surrogates for clinical assessment of orthopaedic patients. Primary appointment in Surgery, Division of Orthopaedics.

Glazebrook, M., PhD, MD (Dalhousie). Clincal: Reconstructive foot and ankle surgery outcomes. Tendon biology, mechanics and overuse. Primary appointment in Surgery, Division of Orthopaedics.

Gonzalez-Cueto, J., PhD (UNB). Biological signal processing, electromyography (EMG), somatosensory nerve evoked potentials, conduction studies, carpal tunnel syndrome, detection, estimation and classification of signal parameters. Primary appointment in Department of Electrical & Computer Engineering.

Kozey, J., PhD (TUNS). Occupational biomechanics and workstation design with emphasis on accessibility, reach and anthropometry. The projects require the use of a variety of human motion analysis techniques. Primary appointment in Health and Human Performance.

Wells, S.M. PhD (Toronto). Structural-mechanical relations in biopolymers such as elastin and collagen are examined in order to determine the underlying mechanism(s) of elasticity of these materials-and thereby to understand the functioning of the arteries, ligaments, skin etc. which they make up. As well, research examines the structural remodeling of these structures during development and maturation: from fetal to adult life. Primary appointment in Physics and Atmospheric Science, Faculty of Science.

Adjunct Professors

The following researchers are also eligible to supervise graduate students in the School of Biomedical Engineering:

Bowen, C.V., PhD (Western). Magnetic resonance imaging physics and engineering. Research activities in cellular and molecular imaging with development of methods for mapping cellular migration patterns and molecular processes using iron-oxide contrast agents. Applications in cellular therapy for regenerative medicine and immunology agents. Applications in cellular therapy for regenerative medicine and immunology research. Also involved in the development of functional MRI techniques for mapping brain activity. Primary appointment at the Institute for Biodiagnostics (Atlantic) - NRC.

Deluzio, K., PhD (Queen's). Gait assessment in osteoarthritis and prosthetic joint replacement, joint kinematics and wear simulation, signal analysis. Primary appointment in Department of Mechanical and Materials Engineering, Queen's University.

DeMont, E., PhD (UBC). Structure and function of natural biomaterials, muscle function in locomotion. Primary appointment in Biology, St. Francis Xavier University.

Labow, R., PhD (University of Michigan). The main focus of her research is understanding the mechanisms of cell-material interaction. Primary appointment in Department Surgery, University of Ottawa Heart Institute.

Lovely, D., PhD (Strathclyde). Myoelectric control systems, electrophysiological instrumentation, digital signal processing for signal enhancement (cardiac), computer interface aids for handicapped. Primary appointment in Institute of Biomedical Engineering at the University of New Brunswick.

McDuffee, L., D.V.M. (Colorado State University), Ph.D. (University of California, Davis) Diplomate, ACVS (American College of Veterinary Surgeons). Orthopaedic research including: (i) investigation of fracture biomechanics, fracture stabilization techniques, and bone healing; (ii) development of new orthopaedic implants; (iii) bone healing investigations involving osteoblasts from osteogentic tissue. Emphasis on the equine species. Primary appointment in the Atlantic Veterinary College, University of Prince Edward Island.

Roscoe, S., PhD (McGill). Prostheses and medical implant devices. Electrochemical techniques to examine the adsorption and interfacial behaviour of proteins. Primary appointment in Chemistry, Acadia University.

I. Introduction

The School of Biomedical Engineering is a collaborative effort of the Faculty of Medicine and the Faculty of Engineering.

The interdisciplinary research within the School of Biomedical Engineering at Dalhousie University is concentrated in three thrust areas: (i) Biomaterials and Tissue Engineering, (ii) Biosignals and Physiological Modelling, and (iii) Human Dynamics and Rehabilitation Engineering. Other significant research efforts in biomedical engineering at Dalhousie include work in kinesiology and gait, instrumentation, cardiac, orthopaedic and cellular mechanics, auditory and vestibular function, robotics, and rational drug design.

The program offers both a Master of Applied Science (MASc) degree and a Doctor of Philosophy (PhD) degree in Biomedical Engineering.

II. Admission

Candidates must satisfy the general requirements for admission to the Faculty of Graduate Studies. In addition to the Faculty of Graduate Studies requirements, the School of Biomedical Engineering has the following requirements for the MASc and PhD programs. Students must maintain a 3.70 or A- GPA to be considered for admission.

A. MASc Program

Students will be accepted into the MASc program from:

1. BEng or BASc from an accredited undergraduate engineering program
2. 4-year BSc in the physical sciences (e.g. Mathematics, Physics, Chemistry, etc.) with research experience**
3. 4-year BSc in the biological sciences (e.g. Physiology, Biophysics, Biochemistry, Microbiology, Immunology, etc.) with research experience**
4. MD, DVM, DDS, or equivalent

In cases (3) and (4) above, additional undergraduate coursework may be required prior to entry into the program. This will depend on the nature of the research thesis to be undertaken and the requirements will be developed in consultation with the school; however, a minimum of 2nd year undergraduate calculus (equivalent to Dalhousie University's MATH 2001.03 and MATH 2002.03) plus linear algebra and/or statistics, and one year of physics and chemistry will normally be required. **Qualifications for research experience include: a research thesis, senior research project, or equivalent work experience determined in consultation with the School of Biomedical Engineering.

A minimum mid-B average during the student's undergraduate coursework (with a minimum average of A- over the last two years) will be required, plus demonstrated ability to communicate and write in English (consistent with the entry requirements of the Faculty of Graduate Studies, e.g. TOEFL>>600).

GRE Aptitude and Advanced scores in one of the sciences are recommended for all applicants whose undergraduate work has been completed outside Canada.

B. PhD Program

Students will be accepted into the PhD program from a Masters degree from an accredited program. Transfer from the MASc program will only be considered for exceptional students who have completed at least 5 half-credit classes and passed a PhD Transfer Examination.

Financial Support

A minimum stipend of $17,500 is available for graduates. Normally, students who are accepted are supported financially either by external sources or Dalhousie scholarships. Additional financing is available for students with external scholarships. Applications should be made early, preferably by April 1 at the latest.

III. Degree Requirements

A. MASc Program

1. At least a total of six half-credit classes (three full credits) to be chosen in consultation with a school advisor. It is expected that a minimum of four of these classes will be taken from the suite of 5000-level classes offered by the School of Biomedical Engineering. In addition, students whose preparation in a particular area is deficient may be required to complete appropriate classes.
2. Attendance and participation in the BME seminar program.
3. A research thesis representing original work by the student will be carried out under the supervision (or co-supervision) of a faculty member of the School of Biomedical Engineering who is also a member of the Faculty of Graduate Studies. This thesis will normally be 75-100 pages in length exclusive of figures, tables, references, etc. Where the student's principal research supervisor is not appointed in the School of BME, a co-supervisor from within the school will be named on the advice of the school's Graduate Studies Coordinator in order to ensure that the thesis contains sufficient Biomedical Engineering content. The student must also undertake a satisfactory oral defense of the research thesis.

B. PhD Program

1. Normally four half credit classes.
2. Attendance and participation in the SBME Seminar Program.
3. Successful completion of a PhD Candidacy Examination.
4. Successful completion and examination of a PhD research thesis.
5. Presentation of research work at one or more national or international conferences.
6. Submission or publication of at least one research paper in a refereed journal.

IV. Supervisory Committees

Each student will have a supervisory committee consisting of their thesis supervisor plus two faculty members appointed to the Faculty of Graduate Studies, of whom one must be a member of the School of Biomedical Engineering, and one will ordinarily not be a member of the School of Biomedical Engineering. The supervising committee will meet at least twice a year (including September following admission) or when called by any member of this committee or the student.

V. Class Descriptions

BMNG 5010.03: Introductory Physiology for Biomedical Engineering.

A survey of the physiology of human organ systems including the nervous, cardiovascular, respiratory, renal, gastrointestinal and endocrine systems. Some emphasis will be placed on engineering principles, including biomechanics, bioelectricity, dynamic systems and control theory, where appropriate.

BMNG 5020.03: Cell Biology for Biomedical Engineering.

This course provides an introduction to eukaryotic cell structure and function for engineering and physical science students who do not have a strong biological background. Topics include: cell structure, organelles, DNA, RNA, transcription and translation, protein production and processing, secretion, cytoskeleton, molecular motors, extracellular matrix, membrane transport, cell-cell communication, and cell division. Some emphasis will be placed on excitable cells, synaptic communication and muscle contraction.

BMNG 5030.03: Pathobiology for Biomedical Engineering.

This class deals with basic pathological processes and general mechanisms of disease that are relevant to Biomedical Engineering. These topics include: (1) cell injury and adaption, (2) inflammation, repair and wound healing, (3) fluid and hemodynamic alterations, (4) diseases of immunity, (5) neoplasia, (6) nutritional and environmental pathology, and (7) arteriosclerosis. Each of these topics will be covered through guided readings followed by discussion in small group sessions. Although focusing primarily on disease processes, the course will also include sessions on the structure of bone, skin and blood vessels, as a basic understanding of these tissues is fundamental to many areas of BME research. The final session will deal with the appropriate use of animal models to study human disease processes. Enrolment is limited to 6 students; permission of instructor is required.

BMNG 5040.03: Introduction to Biomedical Engineering.

Biomedical Engineering includes both: (i) design of devices, instrumentation, or processes for clinical use, and (ii) the application of engineering science and technology to the solution of problems in biological systems. This class will explore both these avenues with an emphasis on the distinctions between scientific and engineering approaches to research and development. Topics include: the history of biomedical engineering, problem solving in the real world, defining design objectives, problem formulation and specification, experimental design and instrumentation, approaches to equipment design, statistical principles for measurement and quality control, optimization principles, economic considerations and impact of technology on medicine, safety and regulatory concerns, ethical concerns in animal and human experimentation, and grant application writing. Wherever possible, actual case studies will be used as examples wherein the above principles have (or have not) been successfully applied.

BMNG 5110.03: Biocompatibility and Biomaterials Design.

This class deals with the scientific basis of biocompatibility (host and materials responses in biomaterials) and its application to intelligent design of biomaterials for implantable systems. The class will be divided into thirds: (i) cellular, tissue-level, and systemic responses to implanted devices, including thrombosis, wound-healing, cytotoxicity, and immunological responses;
(ii) materials degradation including corrosion, dissolution, swelling/ leaching, surface chemistry, etc.; (iii) case studies of materials and device design including: heart valves, total hip prostheses, dental restorative materials, total artificial heart, burn dressings and hemodialysis systems. The class will be evaluated by three literature criticism sessions, a research paper and coupled class presentation, one mid-term test and a final exam.

BMNG 5120.03: Biomechanics in Physiology and Surgical Implant Design.

This class deals with: (i) solid and fluid mechanical analysis of biological tissues and organs, and (ii) use of mechanical engineering techniques in the design of implantable medical devices, e.g. heart valves, vascular grafts, ligament replacements, total artificial heart, and total hip or knee replacements. Topics to be covered include cell structure and mechano-electrical function, blood flow, arterial mechanics, bone structure and mechanics, mechanics and tribology of artificial joints, muscle mechanics, pulmonary functions, fundamentals of gait and mobility aids. Guest lecturers from clinical sciences will help to develop the practical context of biomechanical engineering problems.
EXCLUSION: MECH 4650.03

BMNG 5130.03: Biomechanics of Human Gait.

An overview of the research in biomechanics of human motion with particular focus on gait analysis. Topics include measuring and analysis techniques, biomechanical modelling, and data analysis techniques. Applications include the study of normal, able-bodied gait, and the evaluation of gait pattern changes associated with osteoarthritis, and total knee replacement.

BMNG 5140.03: Principles of Biomolecular & Drug Molecule Design.

An introductory course in biomolecular design, drug design and medicinal chemistry. Students are taught how to identify and formulate the design problem and they are provided with the conceptual and factual tools necessary to tackle the design problem and to design a new chemical entity as a putative therapeutic.
INSTRUCTOR(S): D. Weaver
CROSS-LISTING: CHEM 5601.03

BMNG 5150.03: Introduction to Tissue Engineering.

Tissue engineering is a recent and fast-growing field which encompasses and unites biology, chemistry, medical sciences and engineering to design and fabricate systems to replace tissues and organs. Topics will include tissue engineering scaffolds, cell incorporation (selection and culture), in vivo versus in vitro constructs, and applications of tissue engineering.

BMNG 5160.03: Bioengineering in Orthopaedics and Dentistry.

Orthopaedics and dentistry dominate the medical device market, providing some conspicuous examples of successful biomaterials engineering. This course will explore a number of biological and engineering considerations that arise in the design and development of implants for skeletal tissue replacement or regeneration, with an emphasis on bone/implant interactions.

BMNG 5210.03: Biomedical Instrumentation, Data Acquisition and Analysis.

This hands-on course is an introduction to computer-based acquisition and analysis of physiological signals as relevant to Biomedical Engineering. In an integrated series of lectures and laboratory projects, students will use A/D, D/A, and serial techniques to acquire real and simulated data from a variety of sensors (e.g. electrocardiograms, muscle activity, pressure, flow and images) and to control actuators. Issues such as sampling, aliasing, filtering and image analysis will be examined. Course & lab times may be changed to suit student schedules. Enrolment limited to 14 students.
PREREQUISITE: Permission of instructor

BMNG 5220.03: Mathematical Analysis of Dynamic Biological Systems.

This class is concerned with the construction, analysis and interpretation of mathematical models of dynamical biological systems. Topics covered will include neural networks, electro-biology, epidemiology and the transmission of HIV, the morphology of complex biological and chemical systems, and pattern formation in morphogenesis.
CROSS-LISTING: MATH 5290.03

BMNG 5230.03: Biomedical Signal Analysis and modelling.

This course is directed at the student interested in the analysis of physiological signals and modeling of physiological systems using mathematical methods. It is ideally paired with Biomedical instrumentation which in the spring term covers data acquisition and transducer instrumentation through programming in Labview. In this course the focus will be on analysis of physiological signals using Engineering signal analysis approaches.
PREREQUISITE: Permission of instructor

BMNG 5250.03: Bioelectricity: A Quantitative Approach.

An introductory electrophysiology class, following a quantitative approach based on the general principles established in physics and engineering. The core material covers nonlinear membrane properties of excitable cells that produce action potentials, propagation of action potentials in one-, two-, and three-dimensional excitable media, the response of excitable media to artificial stimuli, and the electromagnetic field that the active bioelectric sources produce in the surrounding extracellular space. Applications to the study of neural and cardiac electrophysiology will be discussed in detail.

BMNG 5260.03: Diagnostic Imaging and Radiation Biology.

This class will discuss the basics of current medical imaging modalities including the mathematical foundations of image processing, and image reconstruction from projections; imaging with ionizing radiation covering aspects of radiation physics and detectors, X-ray CT, SPECT and PET; magnetic resonance imaging methods and techniques; and ultrasound imaging including propagation, scattering and image formation. Students will be working with real images from real, currently-used equipment provided by the Computer Vision and Image Processing Lab, Department of Electrical & Computer Engineering, Dalhousie, and through the internet.

BMNG 5410.20/5420.03/5430.03: Directed Readings in Biomedical Engineering.

This class is designed for students wishing to gain knowledge in a specific area in which no graduate level classes are offered. Class format is variable and may include seminars, lectures, and the study of papers and/or book chapters as part of a directed research or design project. Students are required to present the work (not less than 90 hours per semester), in a written report which will be evaluated. Normally, a student can take only one directed reading class as part of their degree program.

BMNG 9000.00: MASc Thesis.

BMNG 9530.00: Ph.D. in Biomedical Engineering.

FORMAT: Thesis

Business Administration

Location: MBA Program
Kenneth C. Rowe Building
School of Business Administration
6100 University Ave Room 2086
Halifax, NS B3H 3J5
Telephone: (902) 494-1814
Fax: (902) 494-7154
Toll-free in N.A.1-888-432-5622

The School of Business Administration offers a curriculum of undergraduate and graduate studies designed to equip students to serve the community in business, government, and the professions.

Graduates in good standing in any discipline can apply to enter the graduate program leading to the degree of Master of Business Administration.

Director of the School

Klapstein, R.E., BA (Alberta), BSc (Calgary), CMA, MBA, LLB (Dal), LLM (Osgoode Hall),

Professors Emeriti

George, R.E., BSc (London), MS (Bristol), PhD (London)
Parker, J.R.E., BComm (Dal), MBA (Wash), CPhil (Mich), FCA

Professors

Brooks, M.R. BOT (McGill), MBA (Dal), PhD (Wales)
Carroll, R., BBA, BEd (StFX), MBA, PhD (Dal), FCGA
Conrod, J.E.D., BComm (Dal), MBA (Toronto), FCA
Cross, M., AA (Dawson College), BA (Hons.) (Montana), MA (SFU), PhD (Texas A & M)
Duffy, J.F., BS, MS, PhD (Iowa).
Fooladi, I., BS (Iran), MA (Tehran), MS, PhD (Oregon).
MacLean, L.C., BA, BEd (StFX), MA, PhD (Dal)
Mealiea, L.W., BA, MBA (Rutgers), PhD (Mass)
McNiven, J.D., BA, MA, PhD (Mich).
Oppong, A., BSc (Ghana), MBA (Chicago), PhD (Iowa), CGA
Rosson, P.J., DipMS (Salford), MA (Lancaster), PhD (Bath).
Sankar, Y., BA(McGill), MA (Toronto), PhD (Johns Hopkins)
Schellinck, D.A., BSc, MBA (Dal), PhD (Illinois).

Associate Professors

Archibald, B.C., BA (Queen's), MSc (Stanford), PhD (Waterloo)
Blunden, R.G., BComm (Dal), MM (Northwestern), PhD (Western).
Chowdhury, S., BCom, MCom, (Dhaka), MBA, PhD (Kentucky)
Curri, G., MA (Carleton),PhD (Bradford, UK)
Dirksen, C.J., BS (Santa Clara), MBA, PhD (Oregon)
Gassmann, H.I., Vordiplom (Stuttgart), MS (Oregon State), PhD (UBC)
Hebb, G., BA (McGill), MBA (Queen's), MA (Dalhousie), PhD (Texas A&M)
Klapstein, R.E., BSc (Calgary), BA (Alberta), CMA, LLB, MBA, (Dal), LLM (Osgoode Hall)
Larsson, S.O., BSc (SGW), MSc (Alta), PhD (UBC)
Marche, S., BA (Royal Military College), MEd (Alberta), PhD (London School of Economics)
McLarney, C., DipRadTech (Fanshawe), BComm, MBA (Windsor), PhD (York)
Rumsey, J., BA (Berkeley), BEd (Toronto), MSc (Victoria), MBA, PhD (York)
Sagebien, J., BA (Hampshire), MA (Naropa), MBA (Simmons), PhD (London School of Economics)

Assistant Professors

Baltazar, R., BSc (Ateneo de Manila), MIM (Thunderbird), Doctoral Candidate (Saint Mary's)
Grise, M.L., BComm, PhD (Queen's)
MacLean, B.W., BComm, MBA (Dal), CA
Nason, R., BSc, (McMurry), MSc (Pittsburgh), MBA, PhD (Ivey School of Business, UWO), CFA

I. Introduction

MBA Program

The aim of the MBA program is to prepare students to become effective managers in small or large organizations. The program concentrates on developing the ability to make sound decisions and judgements, and trains students in the analysis and evaluation of data for decision making. These skills have wide application in business, government and other organizations. Core classes develop basic skills, while elective subjects strengthen functional skills and deepen understanding of the complex and changing environment facing modern organizations. Required modules in communication develop skills through application. Integration of current computer technology into the curriculum ensures that the learning environment closely approximates that in which graduates will be working. Students may choose to concentrate elective studies in one or two areas.

First year courses are offered in fall and winter terms while second year core courses and electives are offered in the fall, winter and spring terms.

Additional information on the MBA program, including core class descriptions, is found in a brochure published by the School of Business, and available from the School. Students seeking further information should contact the MBA Admissions Office, School of Business Administration.

Telephone: 1-888-432-5622
Email: MBA.Admissions@Dal.Ca
Website: http:/www.dal.ca/mba

II. Admission Requirements

Regulations of the Faculty of Graduate Studies govern admissions. Admission is approved by the Faculty of Graduate Studies, on the recommendation of the School of Business Administration. Applicants must hold a degree recognised by Dalhousie University as the equivalent of a Bachelor's Degree in one of its own faculties. Applicants are also welcomed from those who have concentrated in the humanities, the social sciences, the physical sciences and engineering. A previous business degree is not required. The minimum requirement is a B average (GPA 3.0) or better in the final two years, and a GMAT score of 550, or better.

While the School of Business values the benefits of bringing work experience to the class room, candidates can be admitted directly from undergraduate studies. A résumé and a personal statement should accompany every application. Letters of reference are required.

All applicants are required to submit results of a Graduate Management Admission Test (GMAT). Information on test dates, locations and registration can be obtained from the Dalhousie Registrar, or by writing directly to GMAT, Pearson VUE, PO Box 581907, Minneapolis, MN 55458-1907, USA (1-800-717-GMAT (Americas)) or (http:www.mba.com). The minimum score required for admission is normally 550. Applicants may write the test more than once. Please check with mba.admissions@dal.ca for further information.

Candidates who have received a degree from a non-English language university, whose native tongue is not English, must also submit results of the Test of English as a Foreign Language (TOEFL). We seek a minimum TOEFL score of 580 (paper-based) / 237 (computer-based)/92 (iBT).

(Please note, the following tests will be accepted in place of the TOEFL with the following minimum scores; MELAB 90, IELTS 7, Can Test 4.5)

Deadlines are:

January 31	China
April 1	International - Other, and Canadian automatic scholarship consideration
June 1	Canadian - final deadline (no automatic scholarship consideration)

All applications received later in the year will be considered for the following September admission.

Interim (official) transcripts will be considered for candidates currently attending university, if all other documentation is complete. Since space in the program is limited, all documents must be submitted before May 3l for entry the following September. (January 31 for PRC applications, April 1 for non-Canadian students.) Applications received after these dates may be considered on a space available basis. Automatic consideration for scholarships will only apply to all applications received, in full, by May 1.

A complete application includes:
- $70.00 application fee
- Faculty of Graduate Studies application form
- Two reference letters, (academic - unless working full-time 5+ years)
- GMAT results
- TOEFL results, where applicable (or MELAB, IELTS or Cantest)
- Letter of Financial Guarantee (non-Canadian applicants)
- Transcripts from each institution attended (two copies - both originals)
- A brief statement explaining how you expect the Dalhousie MBA to benefit you, and what you will contribute to the program (two copies)
- Your résumé (two copies)

One copy of the application form, together with the application fee, should be sent to the Registrar's Office. All supporting documentation should be sent directly to the School of Business Administration, MBA Program. Reference letters must be originals, sent directly by the referees, or delivered sealed and signed. Only official transcripts received directly from the issuing institution will be accepted. GMAT and TOEFL score reports must be forwarded by the testing service. Applicants must score 550 or better on the GMAT, and 580 on the TOEFL (237 computerized, 92 IBT) for consideration. MELAB (90), IELTS (7), or Cantest (4.5) may be submitted to replace the TOEFL.

All admitted applicants must confirm in writing their acceptance of the offer of a place, and provide a non-refundable deposit. This deposit will be applied toward tuition, but will be forfeited if the student does not register in the academic year for which he or she was admitted. Please note that this deposit is separate from any application or pre-registration fees, and is the means by which candidates to whom orientation materials are to be sent are identified.

Tuition deposits are normally due:
- Within 30 days for offers made between April 1 and June 15
- Within 10-15 days for offers made after June 1

Note: The Faculty of Law will require a deposit in addition to that required by the School of Business for students in the joint MBA/LLB program.

Students applying for other joint programs must check with the other schools to which they are applying.

III. Grading System and Good Standing

Under the regulations of the Faculty of Graduate Studies and the requirements of the School of Business, MBA students are required to achieve a grade of B- or better in all classes taken. Grades submitted for classes taken outside Dalhousie by letter of permission must conform to Dalhousie standards; that is, a grade of "C" recorded in another institution's transcript will be treated as a "Failure" (below the minimum passing grade of B-) on the Dalhousie transcript.

Students who fail more than one course may not continue in the program unless reinstatement is recommended by the School and approved by the Faculty of Graduate Studies. Please see the Faculty of Graduate Studies regulations in the calendar for further details. In these cases, students must reapply for readmission.

A second failure in the program, regardless of when such failure occurs, will normally result in immediate dismissal from the MBA program.

Within two weeks of the first meeting of a class, each instructor shall make available a written description of the method of evaluation to be used in this class. In any class for which 25 percent or more of the evaluation is based on group work, there must be an exam(s), which must be passed on average.

Special examinations may be granted to students only in the case of illness supported by a medical certificate, or in other exceptional circumstances. Medical certificates must be submitted at the time of the illness and will not normally be accepted after a lapse of one week from the date of the examination.

IV. Degree Programs

The Faculty of Management will be introducing a new MBA Program starting September 2009. One of the changes will include a mandatory internship. While the calendar is kept as up to date as possible it will be produced before the final edits to the new program are complete. Please consult the MBA website for more information in the near future.

A. Twenty Month MBA Program Structure

The twenty month program requires twelve core classes and eight electives. Students normally carry a full class load in the fall and winter: 5.5 in the fall and 5.5 in the winter for a total of 11 classes completed in the first two terms.

First Term

- MGMT 5000X.03: Management Without Borders
- BUSI 5103.03: Accounting
- BUSI 5503.03: Quantitative Decision Making
- BUSI 5511.03: Management Information Systems
- BUSI 5703.03: Business Economics
- BUSI 5801.03: International Business (formerly 6801.03)

Second Term

- MGMT 5000Y.03: Management Without Borders
- BUSI 5007.03: Strategy and Competitiveness (1st year)
- BUSI 5201.03: Financial Management
- BUSI 5305.03: Management of People
- BUSI 5401.03: Marketing Management
- BUSI 5551.03: Operations Management

The second year normally consists of eight electives, plus BUSI 6005.03

Third Term

- Four electives

Fourth Term

- BUSI 6005.03: Strategy Implementation (2nd year)
- Four electives

A variety of electives will allow a student to develop a program in keeping with his/her career plan. If a student wishes to have a concentration, s/he is advised to take the relevant core class, plus three related electives of choice.

Students may elect to take, with the approval of the School, graduate classes in other faculties and departments, such as Mathematics, Statistics and Computing Science, Resource and Environmental Studies, Economics, Public Administration, Law. Throughout the program, candidates will be expected to attend lectures given by visiting professors and business executives and to take part in projects involving the analysis of the problems of local business firms.

B. Ten Month MBA Program Structure

Registration in the ten month MBA program is suspended for the 2008/2009 academic year.

C. Part-time MBA Program

Registration in the Part-time MBA program is suspended for the 2008/2009 academic year.

D. Combined LLB and MBA Program

This is a four-year program which enables students to select classes leading to the degrees of Bachelor of Laws and Master of Business Administration. The proper configuration is for a total 17 (1/2 credit) MBA courses, suggested in sequence as follows:

Note: Students accepted into combined programs beginning in September 2008 must take the MBA portion in Fall 2008. Fees are subject to change in 2009.

Year 1 MBA Fall Term #1

- MGMT 5000X.03: Management Without Borders
- BUSI 5103.03: Accounting
- BUSI 5503.03: Quantitative Decision Making
- BUSI 5511.03: Management Information Systems
- BUSI 5703.03: Business Economics
- BUSI 5801.03: International Business

Year 1 MBA Winter Term #2

- MGMT 5000Y.03: Management Without Borders
- BUSI 5007.03: Strategy & Competitiveness
- BUSI 5201.03: Financial Management
- BUSI 5305.03: Management of People
- BUSI 5401.03: Marketing Management
- BUSI 5551.03: Operations Management

Year 2

- LLB Studies

Year 3

- Two half-credit classes from the MBA program plus Law requirements
- BUSI 6005.03 Strategy Implementation (only offered in winter)
- 25 hours of classes from the LLB program, including 7/9 hours from the Business Law area

Year 4

- Three half-credit classes from the MBA program
- Between 23 and 25 hours of classes in law

Candidates for the LLB/MBA program must satisfy the entrance requirements of the Faculty of Law (see Dentistry, Law and Medicine calendar) and may obtain further information about the combined program by contacting the Faculty of Law or the Admissions Officer of the MBA program. For admission, students must apply to both the Law School and the Business School, separately. Both admission tests (GMAT and LSAT, LSAT only if over 155) are required -- one for each school.

E. MBA/MHSA (Health Services Administration)

This 3 year combined program requires separate application to both the School of Business Administration and the School of Health Services Administration (www.dal.ca/shsa, telephone (902) 494-1547 or email: Health.Services.Administration@Dal.Ca

The proper configuration is for a total 17 (1/2 credit) MBA courses, suggested in sequence, as follows. (It is suggested that the student check with the MHSA Program to determine the minimum course requirements of that degree.):

Note: Students accepted into combined programs beginning in September 2008 must take the MBA portion in Fall 2008. Fees are subject to change in 2009.

Year 1. MBA Fall Term #1

- MGMT 5000X.03: Management Without Borders
- BUSI 5103.03: Accounting
- BUSI 5511.03: Management Information Systems
- BUSI 5703.03: Business Economics
- BUSI 5801.03: International Business
- plus one business elective of choice

Year 1. MBA Winter Term #2
- MGMT 5000Y.03: Management Without Borders
- BUSI 5007.03: Strategy & Competitiveness
- BUSI 5201.03: Financial Management
- BUSI 5305.03: Management of People
- BUSI 5401.03: Marketing Management
- BUSI 5551.03: Operations Management

Year 2. MHSA Studies first year core courses

Year 3. Fall Term #1 (combined MBA/MHSA) studies
- 3 business electives

Year 3. Winter Term #2 (combined MBA/MHSA) studies
- 2 business electives
- BUSI 6005.03 Strategy Implementation (winter only)

F. MBA/MLIS (Library and Information Studies)

This 3-year program requires separate application to both the School of Business Administration and the School of Information Management (http://sim.management.dal.ca, telephone (902) 494-2471 or email: sim@dal.ca). Deadlines for applications are the same as the MBA.

The proper configuration is for a total of 16 courses (1/2 credit) from the MBA suggested in the following sequence. (It is suggested that the student check with the MLIS Program to determine the minimum course requirements of that degree.):

Note: Students accepted into combined programs beginning in September 2008 must take the MBA portion in Fall 2008. Fees are subject to change in 2009.

Year 1. MBA Fall Term #1
- MGMT 5000X.03: Management Without Borders
- BUSI 5103.03: Accounting
- BUSI 5503.03: Quantitative Decision Making
- BUSI 5703.03: Business Economics
- BUSI 5801.03: International Business

Year 1. MBA Winter Term #2
- MGMT 5000Y.03: Management Without Borders
- BUSI 5007.03: Strategy & Competitiveness
- BUSI 5201.03: Financial Management
- BUSI 5305.03: Management of People
- BUSI 5401.03: Marketing Management
- BUSI 5551.03: Operations Management
- MBA Elective

Year 2. MLIS Studies first year core courses

Year 3. Fall Term #1 (combined MBA/MLIS) studies
- 3 business electives, plus any required MLIS electives

Year 3. Winter Term #2 (combined MBA/MLIS) studies
- 1 business electives, plus any required MLIS electives
- BUSI 6005.03 Strategy Implementation (winter only)

G. MBA/MEng

This is a 2 year program that enables students to select classes which will allow them to graduate with a Masters of Engineering and Master of Business Administration. This combination provides graduates with a diverse skill set in two high demand disciplines and also serves as an outstanding tool for the future. Candidates for the MBA/MEng program must satisfy the entrance requirements for both the Faculty of Engineering and the School of Business. Students may obtain further information about the combined program by contacting the Faculty of Engineering or the Admissions Officer of the MBA program.

Note: Students accepted into combined programs beginning in September 2008 must take the MBA portion in Fall 2008. Fees are subject to change in 2009.

The proper configuration is for a total of 15 courses (1/2 credit) from the MBA suggested in the following sequence. (It is suggested that the student check with the MEng Program to determine the minimum course requirements of that degree).

Year 1. MBA Fall Term#1
- MGMT 5000X.03: Management Without Borders
- BUSI 5103.03: Accounting
- BUSI 5703.03: Economics
- BUSI 5801.03: International Business
- BUSI 5511.03: Management Information Systems
- MBA elective

Year 1. MBA Winter Term #2
- MGMT 5000Y.03: Management Without Borders
- BUSI 5201.03: Financial Management
- BUSI 5401.03: Marketing
- BUSI 5305.03: Management of People
- BUSI 5007.03: First Strategy
- BUSI 5551.03: Operations Management

Year 1. MBA Summer Term #3
- Engineering project
- 3 MBA electives

Year 2. MBA Fall Term #1
- Engineering classes

Year 2. MBA Winter Term #2
- BUSI 6005.03 Second Strategy (winter only)
- Engineering classes

Dates:

Deadlines for applications for MEng:

September:	International Students: April 1st
	Canadian Students: June 30th
January:	International Students: August 31st
	Canadian Students: October 31st
May:	International Students: December 1st
	Canadian Students: February 28th

H. Exemptions and Advanced Standing

Students with relevant academic BComm or BBA background may receive exemption or advanced standing for core classes in the MBA program. For further information, contact the MBA Program Manager. Full-time students will not normally be permitted to carry less than a full work load in the first year of the program, regardless of the number of waivers granted.

Students may only apply for exemptions or advanced standing before their program of study forms have been officially signed and approved, in the first term of their first year.

I. Concentrations
- Finance
- International Business
- Marketing

Students in Dalhousie's MBA Program may concentrate in one or two particular areas of study. A concentration is accomplished by taking the core classes in an area (e.g. finance, marketing, or management) plus 3 electives that are designated as part of the concentration in that area.

Finance

The Dalhousie School of Business finance program enjoys an enviable reputation in Canada's financial community for the outstanding work of its faculty and the quality of its graduates. In addition to a solid background in both finance theory and practice, Dalhousie MBA graduates are recognized as having a leading edge view of the financial industry.

The core curriculum gives students an overview of the field with special emphasis on analytical techniques involved in short- and long-term financial decision making. Throughout the program, equal emphasis is

placed on theory and application of theory to solve financial problems. Methodology includes lectures, casework, seminars, assignments, spreadsheet analysis, and multi-disciplinary field projects, as well as a number of other domestic and international learning opportunities. In addition to a challenging, yet balanced curriculum, guest lecturers include some of Canada's top money managers.

Finance electives allow students to more fully explore such topics as short term financial management, investment and portfolio management, the management of financial institutions, theory of finance, international financial management, and international banking. Students wishing to concentrate in finance must complete the core class BUSI 5201 (Financial Management) and are expected to complete at least four finance electives, including Financial Institutions (BUSI 6203), Capital Budgeting (BUSI 6205), and Portfolio Theory (BUSI 6206).

International Business

In a hyper-competitive world of decreasing trade barriers, issues of international business have become critical to the success of businesses of every size and in every sector. To prepare tomorrow's business leaders to better succeed in this challenging multi-cultural environment, the Dalhousie School of Business offers an MBA with a concentration in International Business (IB). At the School of Business, IB studies are overseen by the Centre for International Business Studies (CIBS), co-funded by the University and Export Development Canada. The Centre's faculty, research, and course materials are recognized across Canada and throughout the world for their thorough approach to the issues, opportunities, and threats faced by business on the international stage.

Students choosing International Business as their area of concentration must complete International Business (BUSI 5801) and Strategic Management of International Operations (BUSI 6802), plus any two electives from a list that includes Environmental Management Systems for Business (BUSI 6816), Intercultural and International Management (strongly recommended, and required of Fellowship recipients) (BUSI 6315), International Business Internship (BUSI 6960), International Banking (BUSI 6808), International Financial Management (BUSI 6807), International Marketing (BUSI 6806), and Management and the Natural Environment (BUSI 6813)

In addition to course electives, IB students at Dalhousie can further their learning experience through a number of interesting activities and opportunities supported by the Centre for International Business Studies (CIBS). From a World Business Forum Speaker Series to internship programs and case competitions, the international component of the MBA Program at Dalhousie has much to offer. The innovative Pan-American Program is further described under "Resources and Opportunities". Students are encouraged to discuss these options with professors in the area group.

Marketing

An MBA concentration in Marketing can be the basis of a rewarding lifelong career, providing the tools to excel in leading edge areas such as informatics, relationship marketing, Internet marketing, direct marketing, new media, and marketing strategy. In today's world with increasing global competition, consolidation of formerly diverse market entities, and growing environmental pressures such as changing technology and rapidly shifting economies, managers must have current, relevant, sharp knowledge, skills and experience. The marketing concentration offers an opportunity to develop these attributes.

The current shift from mass marketing to relationship marketing, in particular, triggers a need for leaders in the field - new marketing professionals with new skills. Students choosing the marketing concentration in the MBA Program are guided and challenged by professors who are current in their area of knowledge and expertise and who are continuously refreshing their capacity through globally recognized research. Associated with the Centre for Management Informatics in the Faculty of Management, the Marketing area group provides a core of expertise to the School of Business. The electives may include Marketing Informatics, Buyer Behaviour, International Marketing, Advertising Management, Transportation Management, Internet Marketing, Direct Marketing or any other relevant marketing elective. MBA students seeking a specialized concentration, such as in the area of Informatics, should seek advice from the professors in that particular area. Marketing professors are also helpful to students by providing career and internship advice and support. Their close connection to the marketing industry affords students many entry opportunities they would not have if they were not attending the Dalhousie MBA Program, concentrating in Marketing.

J. MBA Financial Services

The Dalhousie MBA (Financial Services) degree helps managers in the financial services industry enhance their skills by furthering their abilities to exercise leadership and make sound business decisions, honing their analytical skills, and sharpening their judgment in managerial and client service roles. The program broadens the horizons of financial managers by exposing them to business concepts necessary inside and outside the industry, thereby enhancing performance in their present positions and increasing their scope of career opportunities. Successful applicants integrate their new knowledge into their everyday job responsibilities. This is done on a course-by-course basis both in existing positions and as their careers progress within the financial services industry.

K. MBA (Financial Services) (ICB Stream)

Program Overview

To be admitted to the MBA (Financial Services) Program, you must have completed at least four ICB courses from either the Professional Banking Program (PBP) or the Personal Financial Planning and Personal Trust (PFP/PT) Programs. Students accepted to the MBA (Financial Services) Program at Dalhousie University are required to complete and will be given credit for a set number of ICB courses: either seven courses in the PBP, or eight in the PFP/PT programs as well as 9 required MBA courses from Dalhousie University. When completed, these courses are recorded on your Dalhousie transcript. The Institute of Canadian Bankers and Dalhousie University have made arrangements to facilitate the application process. ICB courses must not be more than 10 years old. As well applicants must have a degree recognized by Dalhousie University as equivalent to an undergraduate degree with an equivalent Grade Point Average (GPA) of 3.0 (on a 4.3 scale). Applicants with a GPA less than 3.0, must have at least five years experience in the financial services industry at the appropriate management level.

PROGRAM CHART

ICB Financial Services Management Professional Banking Program (PBP)
Human Resource Management: A Financial Institution Perspective
Global Financial Systems and Markets
Financial Services Marketing
Using Information Technology to Gain Competitive Advantage
Bank Financial Management *(includes the internationally acclaimed BankMod™ simulation)*
Strategic Thinking: A Financial Services Approach
Integrative Project

ICB Wealth Management Personal Financial Planning / Personal Trust Programs (PFP/PT)		
Stream I		Stream II
Servicing the Client	PFP/PT	Fundamentals of Personal Finance

Wealth Valuation	PFP	Investment and Taxation Fundamentals
Risk and Insurance	PFP/PT	Insurance and Retirement
Investment and Portfolio Management	PFP	Investment and Tax Planning
Estate Planning	PFP	Risk Management and Estate Planning
Engineering of a Trust	PT	Engineering of a Trust
Trust and Estate Management	PT	Trust and Estate Management
Using Information Technology to Gain Competitive Advantage		Using Information Technology to Gain Competitive Advantage

Dalhousie University MBA Financial Services
BUSI 5103 Accounting
BUSI 6207 Advanced Corporate Finance
BUSI 5511 Information Systems for an Information Age
BUSI 5703 Business Economics
BUSI 5801 International Business
BUSI 6326 Management Skills Development
BUSI 6410 Advanced Marketing
BUSI 5503 Quantitative Decision Making
BUSI 6990 Strategic Leadership and Change

L. MBA (Financial Services) CSI Stream

Program Overview – Required Courses

To be admitted to the MBA (Financial Services) Program, applicants must have completed 6 courses from the CSI (see chart below) with an overall average mark that must be 70% or greater. When completed, these courses are recorded on your Dalhousie University transcript as 6 advanced standing courses. Applicants must have a degree recognized by Dalhousie University as equivalent to an undergraduate degree, with an equivalent Grade Point Average (GPA) of 3.0 (on a 4.3 scale). Applicants with a GPA of less than 3.0 must have at least five years experience in the financial services industry at the appropriate management level.

Mandatory

All applicants must complete this category.

- Canadian Securities Course (CSC)

Core

Applicants must complete one of the core pairings.

- Professional Financial Planning Course (PFPC) and Wealth Management Techniques (WMT)
- Investment Management Techniques (IMT) and Portfolio Management Techniques (PMT)
- Derivatives Fundamentals Course (DFC) and Technical Analysis Course (TAC)
- Derivatives Fundamentals Course (DFC) and Financial Markets Risk Management (FRM)

Elective

Applicants must complete 3 electives. If a course is to be counted as an Elective, it cannot also be counted as part of a Core program.

- Professional Financial Planning Course (PFPC)
- Wealth Management Techniques (WMT)
- Investment Management Techniques (IMT)
- Portfolio Management Techniques (PMT)
- Derivatives Fundamentals Course (DFC)
- Options Licensing Course (OLC)
- Futures Licensing Course (FLC)
- Technical Analysis Course (TAC)
- Options Strategies Course (OSTC)
- Agricultural Markets Risk Management Course (ARM) – only offered on special order to groups
- Energy Markets Risk Management Course (ERM)
- Financial Markets Risk Management Course (FRM)
- Canadian Insurance Course (CIC)

Dalhousie University MBA Financial Services
BUSI 5103 Accounting
BUSI 5703 Business Economics
BUSI 6410 Advanced Marketing
BUSI 6207 Advanced Corporate Finance
BUSI 5801 International Business
BUSI 5503 Quantitative Decision Making
BUSI 5511 Information Systems for an Information Age
BUSI 6326 Management Skills Development
BUSI 6XXX Risk Management
BUSI 6990 Strategic Leadership and Change

M. MBA (Financial Services) CFP Stream

Admission Requirements

To be admitted to the MBA (Financial Services) Program, applicants must have completed the CFP program from the Financial Planners Standards Counsel (CFP designation - Certified Financial Planner Professional Designation). Applicants should have a degree recognized by Dalhousie University as equivalent to an undergraduate degree, with an equivalent Grade Point Average (GPA) of 3.0 (on a 4.3 scale). Applicants with a GPA of less than 3.0 must have at least five years experience in the financial services industry at the appropriate management level. Additionally, you must complete and submit all necessary application documentation.

Required Dalhousie University Courses

- BUSI 5103 Accounting
- BUSI 6207 Advanced Corporate Finance
- BUSI 6410 Advanced Marketing
- BUSI 5703 Business Economics
- BUSI 5801 International Business
- BUSI 5503 Quantitative Decision Making
- BUSI 5511 Information Systems for an Information Age
- BUSI 6326 Management Skills Development
- BUSI 6300 Risk Management
- BUSI 6990 Strategic Leadership and Change
- 2 Additional Courses (TBA)

N. MBA (Financial Services) Insurance Stream

Program Overview

To be admitted to the MBA (Financial Services) Program, you must have earned the FLMI designation from LOMA with a minimum average grade of 80%. Applicants must have a degree recognized by Dalhousie University as equivalent to an undergraduate degree, with an equivalent Grade Point Average (GPA) of 3.0 (on a 4.3 scale). Applicants with a GPA of less than 3.0 must have at least five years experience in the financial services industry at the appropriate management level.

LOMA and Dalhousie University have made arrangements to facilitate the application process. At your request (accompanied by a modest fee), LOMA will send Dalhousie official confirmation that you have earned the FLMI, along with your average scores.

Please note that the FLMI courses listed below are the requirements as of May 2003 for completing LOMA's FLMI Program. If you received the FLMI designation at a time when the curriculum requirements were different than those listed below, you are still eligible to apply for admittance into the MBA (Financial Services) Program. If the FLMI curriculum changes in the future to accommodate changes in the financial services industry, then an FLMI designation earned under the new curriculum will also be eligible for admittance to the MBA (Financial Services) Program.

Students accepted to the MBA (Financial Services) Program at Dalhousie University are required to complete the twelve courses as listed in the chart below.

Fellow, Life Management Institute (FLMI) Program
Principles of Insurance: Life, Health and Annuities
Insurance Company Operations
Insurance Administration
Legal Aspects of Life and Health Insurance - Canada OR Business Law for Financial Services Professionals
Marketing Life and Health Insurance
Management Principles and Practices
Information Management in Insurance Companies OR Investments and Institutional Investing
Financial Services Environment
Accounting and Financial Reporting in Life and Health Insurance Companies
Managing for Solvency and Profitability in Life and Health Insurance Companies

Dalhousie University		
BUSI 5103 Accounting	BUSI 6410 Advanced Marketing	BUSI 5703 Business Economics
BUS 6207 Corporate Finance	BUSI 5511 Information Systems for an Information Age	BUSI 5801 International Business
BUSI 6326 Management Skills Development	BUSI 5703 Quantitative Decision Making	BUSI 6XXX Concepts of Risk Management
BUSI 6XXX Enterprise Risk Management	BUSI 6XXX Legal Aspects of Risk Management	BUSI 6990 Strategic Leadership and Change

1. Program Continuance

Students of the Centre for Advanced Management Education (CFAME) who wish to refrain from taking courses during a term may pay a $50.00 fee and submit a Program Continuance form to maintain their registration status. In cases where no appropriate courses are offered for that term, the fee will be waived but the Program Continuance form must be submitted. The form must be originated and signed by the student and the Program Manager, and approved by the Faculty of Graduate Studies. Students are permitted unlimited program continuances over their seven year completion period; however, the period a student is on Program Continuance is counted toward the seven year completion limit. Program Continuance applies to students in the MBA (FS) and MPA (M) programs only.

2. Contact

Students seeking further information should contact the Centre for Advanced Management Education (CFAME):

Telephone: (902) 494-6391
Toll Free: 1(800) 205-7510
Fax: (902) 494-5164
Email: mbafs@management.dal.ca
Website: http://mbafs.management.dal.ca/

V. Core Classes for MBA

MGMT 5000.03: Management Without Borders: A Foundation Course for Masters Students in Management.

This course places management in its broadest context and helps students from diverse disciplines understand the complex social, economic, ecological, political and technological forces shaping 21st century leadership in the public, private and non profit sectors. Key themes explored in the course include systems thinking, values based approaches to management, and personal and professional development.
NOTE: Public Admin students please see the printed calendar for additional information.
INSTRUCTOR(S): D. Wheeler/P.Brown
FORMAT: Lecture/discussions

BUSI 5007.03: Strategy and Competitiveness.

This class is about the general manager's task of managing strategy in all types of organizations. The class develops concepts, frameworks, techniques, and skills that are foundational to the development and execution of strategies that are competitively sound, organizationally doable, and effective in guiding organizational decisions and actions.

BUSI 5103.03: Accounting.

This class introduces the principles and practices necessary to process and communicate financial information about an organization to different user groups. The emphasis is on financial statement accounting, reporting, analysis, and management information needs, along with managerial accounting principles

BUSI 5201.03: Financial Management.

This is an intensive and complete overview of finance, with special emphasis on analytical techniques involved in short and long-term corporate financial decisions. Equal emphasis is placed on theory and application of theory to financial problems.

BUSI 5305.03: Management of People.

This class helps to build understanding in dealing effectively with human resource problems in organizations. The focus of the class is management behaviour in the process of working with people to produce effective results.

BUSI 5401.03: Marketing Management.

Marketing Management is concerned primarily with problem-solving and decision-making situations that confront management in the administration of marketing operations. The goal of this class is to develop skill in the sound analysis of given marketing situations, resulting in effective management action to recognize and capitalize on opportunities. Instruction will be a mixture of case discussions, projects, and lectures.

BUSI 5503.03: Quantitative Decision Making.

This is an introductory course in quantitative methods with emphasis on business applications. Throughout this class an emphasis is placed on helping the student to recognize situations and areas in business in which quantitative analysis might be useful.

BUSI 5511.03: Management Information Systems.

This class is meant to provide the student with a basic knowledge of information systems and their role in business organizations. Fundamental to this basic knowledge is an understanding of the variety of information systems in business. An understanding of the use of computers in current and future information systems is stressed.

BUSI 5551.03: Operations Management.

All managers should be familiar with the key concepts and techniques required to manage the production function of an organization (whether it provides goods or services), regardless of their specialist functional interests. This is especially true for those who aspire to reach senior general management positions. The purpose of this class is to provide an introductory overview of production/operations management for such individuals, covering the key concepts and the latest developments in the field.

BUSI 5703.03: Business Economics.

The external environment in which businesses operate presents opportunities, constraints, and threats to the operating and competitive decisions of business managers. This class provides a framework for the economic analysis of these issues.

BUSI 5801.03: International Business.

This class provides a survey treatment of international business that will benefit all MBA students and build a foundation for those proposing future study in this area. For students not going on in the field, it provides the tools needed to manage the interdependence between domestic and international markets.

BUSI 6005.03: Strategy Implementation.

Strategy Implementation builds on Strategy and Competitiveness and other MBA courses by focusing on the implementation of strategies once they are developed. It is integrative, dealing with the organization as an integrated whole, from the perspective of the general manager. Specific topics include implementing strategy, strategy and organization, leadership, corporate culture, and the management of strategic change in organizations. Students are exposed to a wide variety of organizations through case studies and have the opportunity to examine a single organization in detail through their field consulting projects. **(Open to second-year students only.)**

VI. Elective Classes

NOTE: Not all classes are offered every year. Please consult the university timetable for a list of current offerings.

ELECTIVES

Electives may also be chosen outside the MBA from class listings of the other departments within the Faculty of Management: Public Administration, Library and Information Studies, Environmental Studies, and Marine Affairs. This adds a total of 80 classes to the regular elective choice of MBA students at Dalhousie University. As well, it encourages cross-functioning between disciplines.

Opportunities for Cross Learning

MBA students also study alongside a diverse range of Masters students in a wide range of classes which span a number of Schools and Faculties. One example is the Master of Electronic Commerce (MEC) Program where Masters students often study alongside regular MBA students in the MBA courses. Other students to whom an MBA might be exposed (or Schools in which an MBA student might choose to pick up an elective beyond the MBA but counting toward their degree) are: Master Environmental Studies, Master Public Administration, Master Library and Information Studies, Master Economics, Master Political Science, etc. As well, up to 33% of a student's elective courses may be taken at another university on a letter of permission, as per Faculty of Graduate Studies regulations.

BUSI 5402.03: Buyer Behavior.

Designed to emphasize the "marketing concept," this class is basically an overview of the literature in consumer/industrial buyer segmentation and consumer/industrial buyer behavior models.
FORMAT: Lecture
PREREQUISITE: BUSI 5401

BUSI 6002.03: New Venture Creation.

New Venture Creation is about entrepreneurship: the process of creating new businesses. It employs cases, experiential exercises, and a major project to expose students to the issues, problems, and challenges of creating viable new businesses. The project provides students with the opportunity, within the framework of a formal class, to explore and develop business ideas they have been considering or wish to investigate. The final output of the project is a feasibility study, business plan, and financing proposal for a new venture.
FORMAT: Lecture/Seminar
PREREQUISITE: All first year core classes (BUSI 5103, 5201, 5305, 5401, 5511, 5551, 5503, 5703, and 5801)
CROSS-LISTING: ECMM 6024.03

BUSI 6003.03: Managing the Diversified Firm.

Managing diversification addresses the practice of strategic management in the diversified firm. Through cases, readings, and projects, the class examines the theory of diversification and alternative diversification strategies, internal growth, acquisition, related and unrelated diversification. Other topics addressed include integration of the new acquisition and divestiture.
PREREQUISITE: BUSI 5101.03, 5102.03, 5201.03, 5305.03, 5401.03, 5503.03, 5551.03, or permission of the instructor

BUSI 6004.03: Corporate Strategy and Sustainability.

FORMAT: Lecture

BUSI 6006.03: Managing the Family Enterprise.

Managing the Family Enterprise is about the special problems and issues that confront family businesses. It explores the family system, the business system, and their interactions - functional and dysfunctional.
FORMAT: Lecture/Seminar
PREREQUISITE: BUSI 5103, 5201, 5305, 5401, 5551, 5503
CROSS-LISTING: COMM 3308.03

BUSI 6007.03: Starting the Emerging Technology Venture.

This is the first of two elective classes in entrepreneurship for emerging technologies. This class has three modules: New Product Development, Financing the Emerging Technology Venture, and Marketing the Emerging Technology Venture.
FORMAT: Seminar/Lecture
PREREQUISITE: All first year core MBA courses classes (BUSI 5103, 5201, 5305, 5401, 5511, 5551, 5503, 5703, and 5801)

BUSI 6008.03: Managing the Emerging Technology Venture.

This is the second of two elective classes in entrepreneurship for emerging technologies. Together these two classes offer an opportunity to focus, in an integrated way, on the issues and problems of starting and managing emerging technology ventures. This class has three modules: Incentives, Options and Other Human Resource Issues in Emerging Technology Ventures, and Management of Growth and Innovation.
FORMAT: Seminar/Lecture
PREREQUISITE: All first year core classes (BUSI 5103, 5201, 5305, 5401, 5511, 5551, 5503, 5703, and 5801)

BUSI 6009.03: Business and Government.

The aim of this class is to explore the relationship between businesses and the public sector. Government impinges on business policy and activities through laws, regulations, subsidies, taxes, and its spending powers. How businesses can and do influence decisions in these areas constitutes the technical matter of the class. As a matter of necessity, the class assumes some prior general knowledge of the Canadian political system. This can be gained from either general politics classes or by some preliminary reading on the subject.
FORMAT: Lecture/seminar
CROSS-LISTING: PUAD 6500.03

BUSI 6010.03: Corporate Environmental and Social Responsibility Beyond Apathy, Outrage & Orthodoxy.

This seminar examines how business leaders manage a broad set of corporate objectives in an increasingly interdependent global economy. The class explores ways to balance social, economic development, and environmental objectives with standard managerial financial objectives. It examines the role of public, private and civil society agents.
FORMAT: Seminar

BUSI 6101.03: External Auditing.

This class covers the theory and practice of public auditing according to generally accepted auditing standards. The first half of the class considers the forces impacting on the setting of auditing standards and the current level of standards. The second half of the class considers typical audit programs for examination of balance sheet and income statement accounts.
FORMAT: Seminar
PREREQUISITE: BUSI 5103.03
CROSS-LISTING: COMM 3114.03

BUSI 6102.03: Taxation.

This class takes an in-depth look at personal income taxation and provides an introduction to the taxation of corporations in Canada. It is designed for accounting majors as well as for students wishing to acquire a working knowledge of the Canadian Income Tax Act and its application. The class is revised each term to provide up-to-date coverage in a rapidly changing taxation environment.
FORMAT: Seminar
PREREQUISITE: BUSI 5103.03, 5703.03
CROSS-LISTING: COMM 4120.03

BUSI 6106.03: Cost Management.

The major objective of this class is to develop a deeper understanding of the key topics in cost/managerial accounting practices and their management control implications. This class is intended primarily for students who plan to concentrate their studies in the accounting area.
FORMAT: Lecture
PREREQUISITE: BUSI 5103.03

BUSI 6108.03: Advanced Financial Accounting I.

This is meant to provide an understanding of corporate financial reporting and the related conceptual framework. The class develops technical expertise in various financial accounting topics including liability and equity issues, leases, pensions, income tax, accounting changes, and EPS. Classwork may include casework and a term paper, in addition to highly quantitative material.
FORMAT: Lecture
PREREQUISITE: BUSI 5103.03
CROSS-LISTING: COMM 3111.03

BUSI 6109.03: Advanced Financial Accounting II.

This class has two primary objectives: first, to provide an in-depth study of the interrelated topics of intercorporate investments, business combinations, consolidated financial statements and foreign operations; second, to develop a framework that may help to resolve controversial issues in advanced financial accounting.
FORMAT: Lecture
PREREQUISITE: BUSI 6108.03
CROSS-LISTING: COMM 4102.03

BUSI 6110.03: Advanced Financial Accounting III.

This class provides a reporting overview of intermediate and advanced topics in accounting, as well as several specialized accounting issues. The emphasis of the class is on case analysis, through written submissions and presentations. The following is a list of some of the topics covered in the class: non-profit accounting, current accounting standards, valuation, estates and trusts, and bankruptcy.
FORMAT: Lecture
PREREQUISITE: BUSI 6108.03
CROSS-LISTING: COMM 4101.03

BUSI 6112.03: Financial Statement Analysis.

This class is intended to provide an analytical understanding of the usefulness of conventionally reported financial data in investment and credit decision-making. It covers topics that include the following: prediction of future earning, prediction of financial distress, and the relationship between financial statement numbers and behavior of stock prices.
FORMAT: Lecture
PREREQUISITE: BUSI 5103.03, 5201.03, and 5503.03

BUSI 6114.03: Information Systems Controls.

This class examines special considerations when auditing in a computerized environment. Three major areas covered in the class are: (1) Internal control techniques/requirements, the standards associated with computerized processing of transactions, creation and control over databases, and special planning for interruption and restart of computer operations. (2) Audit procedures in a computerized environment. (3) Use of computer-assisted audit techniques, including "Interactive Data Extraction and Analysis," a software package from the Canadian Institute of Chartered Accountants, developed by the Auditor-General of Canada.
FORMAT: Lecture
PREREQUISITE: BUSI 5103.03, 5511.03

BUSI 6201.03: Investments I.

This class covers investment theory and its applications by practicing investment analysts. Students employ quantitative tools of investment analysis, financial models, statistics, and software, along with standard library sources, to write investment reports.
FORMAT: Lecture
PREREQUISITE: BUSI 5201.03.03.

BUSI 6202.03: Derivatives and Securities.

This class focuses on derivative securities, including futures, forward contracts, and options. Applications of derivative security theory in traditional and innovative securities, index arbitrage, and portfolio insurance are emphasized, along with the macro impact of derivative securities on the capital market. The class places approximately the same emphasis on the pricing of derivatives as it does on the application of derivatives.
FORMAT: Lecture
PREREQUISITE: BUSI 5201.03

BUSI 6203.03: Financial Institutions.

The objectives of this class are to identify Canada's capital markets, to review the flow of funds within these markets, to evaluate financial assets/financial liabilities in terms of risk/return relationships, and to identify and evaluate the relative positions of the main participants in the markets.
FORMAT: Lecture
PREREQUISITE: BUSI 5103.03, 5201.03.

BUSI 6206.03: Portfolio Theory.

This class is designed to introduce to students a modern theory of investment, portfolio theory, and to discuss its applications to individual and institutional investors. It covers a thorough review of theories on the "buy side" of the investment world from Markowitz to the latest developments in the field, in order to provide students with the needed skills to successfully face the challenging world of portfolio and money management. Classroom lectures and problem-solving methods are used throughout the term. A major project, involving the analysis of actual data, is also assigned as a primary teaching instrument.
FORMAT: Lecture
PREREQUISITE: BUSI 5103.03, 5201.03

BUSI 6208.03: Mergers, Acquisitions and Restructuring.

The aim of this class is to provide both introductory and in-depth analyses of contemporary corporate control topics in finance. The material for the class is based on a selection of readings from textbooks, current articles from major finance journals, and court testimony from a landmark case.
FORMAT: Lecture
PREREQUISITE: BUSI 5103.03, 5201.03

BUSI 6300.03: Concepts of Risk Management.

This comprehensive course covers both enterprise risk management and financial risk management. The course examines the essential methodologies for uncovering, measuring and managing risk exposures. Specific topics include operational, strategic, and reputational risk, and the COSO framework for risk integration. Additionally financial hedging concepts with derivatives are studied.
FORMAT: Distance/on-line portion (14-17 weeks), in-classroom portion 3.5 days

BUSI 6312.03: Organizational Design.

The behavior and performance of individuals are significantly influenced by organizational design. The design involves the formal systems and process, specialization, hierarchy, authority-power, communications, reward systems, and accountability. The purpose of the course is to examine the evolution of design strategies, review some of the different approaches to design now being utilized in organizations, and consider differences in behavior and performance in organizational systems employing different design strategies. The course will not offer a particular design as the answer to organizational-managerial problems, but will propose some steps that managers should consider before designing their organizations.
PREREQUISITE: BUSI 5305.03

BUSI 6313.03: Organizational Change.

This class provides the student with an understanding of major conceptual approaches to the changing organization, including changing people, technology, and structure. Emphasis is placed on the analysis of the dynamics and process of change through case studies, and the exploration of programs of organizational change, including grid and laboratory programs, and the use of consultation.
FORMAT: Lecture/seminar
PREREQUISITE: BUSI 5305.03

BUSI 6315.03: Intercultural and International Management.

This class is designed to familiarize participants with behavioral problems and challenges facing managers interacting with people from other cultures in foreign or domestic work settings. The class also examines research findings in the field to investigate the similarities and differences found in managerial practices of selected cultures.
FORMAT: Lecture
PREREQUISITE: BUSI 5801.03, 5305.03
CROSS-LISTING: COMM 4315.03

BUSI 6322.03: Staffing.

This class considers the strategies and problems in human resource recruiting and selection and examines its impact on organizational effectiveness. Topics include: job analysis, employment forecasting, recruiting strategies, basic selection models, interviewing methods, and evaluation of selection programs. As all managers participate in selecting subordinates, this class is appropriate for the generalist as well as the human resource specialist.
FORMAT: Seminar/lecture
PREREQUISITE: BUSI 5305.03

BUSI 6323.03: Training & Development.

This class covers methods currently employed in the training and development field. The primary purpose is to develop students' expertise in the training and development area. Since all managers have to develop themselves and their subordinates, this class is relevant for generalists as well as human resource specialists.
FORMAT: Seminar
PREREQUISITE: BUSI 5305.03

BUSI 6326.03: Management Skills Development.

This class exposes students to key knowledge, skills, and attitudes (KSAs) considered critical to managerial success. Such exposure is designed to provide the student with behaviors that will help ensure that, when managing human resources, staff will perform at or near peak capabilities. This is a skill-building class. Significant amounts of classroom time are devoted to behavior modeling exercises, role-plays, case studies, and group discussions.
FORMAT: Seminar
PREREQUISITE: BUSI 5305.03

BUSI 6401.03: Marketing Research.

This class is designed to give the student an appreciation of the scope of marketing research techniques. The goal of the class is to provide students with sufficient background to make them knowledgeable users of marketing research information. Marketing research will be related to model building, information systems, and the concept of value of information.
FORMAT: Seminar
PREREQUISITE: BUSI 5402.03, strongly recommend BUSI 6504.03

BUSI 6403.03: Advertising Management.

Designed to improve analytical skills and decision-making capabilities through the practical application of advertising concepts and principles, this class considers market positioning, the psychology of mass communication, copy strategy, media selection, budgeting, and advertising research.
FORMAT: Lecture/seminar
PREREQUISITE: BUSI 5401.03, strongly recommend BUSI 5402.03

BUSI 6408.03: Transport Modes.

This class will introduce the student to the business of managing a transport enterprise. It will focus on understanding the regulatory environment and customer requirements prior to exploring operational considerations across a number of transport modes and what that means for marketing the transport company and structuring it for growth. The class is suitable for students wishing to work in the transport industry, in the supply chain activities of a transport customer or, tangentially, in the strategic management of any service business.
FORMAT: Lecture/seminar
CROSS-LISTING: COMM 3408.03

BUSI 6409.03: Internet Marketing.

This class begins by developing a framework so that the forces driving Internet in marketing and business are understood. With this foundation in place, a series of online marketing themes are explored, including customer support and online quality; personalization; new product development on the Net; traffic and brand building; online community; pricing in an online world; and e-commerce.
FORMAT: Lecture/seminar
PREREQUISITE: BUSI 5401.03

BUSI 6420.03: Marketing Informatics.

A revolution in marketing requires marketers who have a whole new set of skills and knowledge focused on the application of technology and associated practices. Large companies require marketers with the skills necessary to work with IT people to develop effective customer information files and information from other sources. They need to be able to use data mining tools and techniques to understand buyer behavior, identify relevant segments, and develop effective strategies using all of today's new media and channels. This is a leading edge class.
FORMAT: Lecture/seminar
PREREQUISITE: BUSI 5401.03, 5503.03, 5511.03

BUSI 6450.03: Marketing Strategy Seminar.

This is the capstone class in marketing. As such, it is designed to draw together the individual marketing classes offered in the MBA program. Extensive use will be made of case studies requiring students to develop complete marketing strategies for companies in "real-life" situations. Student presentations of their case analyses will form an important part of the class. Presentations will be videotaped and a critique provided by the instructor.
FORMAT: Seminar
PREREQUISITE: BUSI 5401 and at least two 6000-level marketing classes, which may be taken concurrently, or permission of the instructor

BUSI 6504.03: Multivariate Analysis.

The convenience of packaged statistical programs (e.g., SPSS and Minitab) has opened the area of data analysis to researchers with a wide variety of backgrounds. Since it is possible to operate statistical software without understanding advanced mathematics, there is a need for a class designed around a packaged statistical program which introduces the user to the basic concepts underlying the techniques. Students interpret statistical programs using data sets from such business areas as marketing, finance, and organizational behavior.
FORMAT: Seminar
PREREQUISITE: BUSI 5503.03
CROSS-LISTING: COMM 4538.03

BUSI 6516.03: Database Management Systems.

Database design and administration are at the core of any organization's information system. Any MIS professional needs to understand the fundamentals of organizational and network database design and the new technique of object oriented analysis. The student will develop an appreciation of current problems in database design and administration.
FORMAT: Lecture/seminar
PREREQUISITE: BUSI 5511.03
EXCLUSION: BUSI 6906.03 (former number)

BUSI 6519.03: Systems Analysis and Applications Development.

This class is designed to provide students with a basic understanding of systems analysis and an overview of application development. Students will be involved in the development of databases using various software applications, primarily Access and Visual Basic. In addition, students will develop, document, and deliver an application to an outside end-user.
FORMAT: Lecture/seminar
PREREQUISITE: BUSI 5511.03
EXCLUSION: BUSI 6908.03 (former number)

BUSI 6520.03: Electronic Commerce.

For years, businesses have been using the computer and information technology to achieve internal efficiencies. In particular, this class examines the recent and rapid growth of electronic commerce from four approaches: an introduction to electronic commerce; EDI and re-engineering; electronic commerce and the Internet; and organizational issues in implementing electronic commerce.
FORMAT: Lecture/seminar
CROSS-LISTING: ECMM 6020.03

BUSI 6522.03: Knowledge & Data Mining.

Data mining technology and the surrounding management processes are now collectively referred to as Knowledge Discovery in Databases (KDD). KDD methods have been successfully deployed in the financial, marketing, and quality control areas of major corporations and for various special projects in engineering, science, and medicine. This class covers the KDD process and the theory and practical application of data mining technologies such as artificial neural networks, inductive decision trees, and deductive modeling software to real-world problems of business and industry.
FORMAT: Lecture/seminar
PREREQUISITE: BUSI 5511.03, BUSI 5503.03

BUSI 6523.03: Information Technology Project Management.

This class will cover the principles of project management generally and for Information Technology Projects in particular. There is a set of generic project management disciplines that apply everywhere, and there are considerations specific to IT development challenges. Students will learn those differences as well as generic principles of project management. Through real projects with real clients, students will gain a real-world understanding of the challenges of project management.
FORMAT: Lecture/seminar
PREREQUISITE: BUSI 5511.03, BUSI 5503.03
CROSS-LISTING: ECMM 6022.06, HINF 6300.03

BUSI 6525.03: Human Computer Interaction.

Explores how technology affects human use, and examines the process from conception of an idea to design and evaluation, with a particular emphasis on Web-based applications.
FORMAT: Lecture/seminar
CROSS-LISTING: LIBS 6630.03

BUSI 6526.03: Evaluating the Interface to Products/ Services.

Theoretical and practical examination of user interface evaluation. Evaluation criteria, metrics and the protocols for assessing selected characteristics of usability will be explored. The emphasis is on learning and applying a series of techniques for evaluation, and for choosing appropriate criteria for testing depending on the objective of the tests.
FORMAT: Lecture, seminar
PREREQUISITE: BUS 5511 or equivalent

BUSI 6540.03: Measurement and Methodological Approaches in Risk Management.

This course is concerned with the methodology and measurement of risk. The course content will provide the measurement tools and methodological approach available in the study of risk. The course is presented in five modules in fourteen lessons. Module 1 provides an introduction to the theory of risk and a review of basic statistical concepts used in risk measurement. Module 2 presents the foundation of risk assessment using modern portfolio theory and risk specific analysis applications. Module 3 continues with risk assessment models presenting alternative approaches and using regression analysis applications. Module 4 discusses the role of options in risk measurement and assessment. Module 5 provides real world applications of risk measurement by presenting several risk based studies.
INSTRUCTOR(S): M. Foster
FORMAT: Distance/on_line portion (14_17 weeks), in classroom portion 3.5 days
PREREQUISITE: BUSI 5503.03

BUSI 6601.03: Legal Aspects of Risk Management and Governance.

This course focuses on law and legal compliance from the perspective of managing risk. Being the only legal laspects course in the program, it establishes a foundation in the most relevant areas of law, including dorts, contracts, interventions by equity, insurance, and business associations. It also considers the real-world problems faced by those engaged in the practice of corporate governance and examines the ethical considerations involved.
FORMAT: Online/distance and intensive

BUSI 6802.03: Strategic Management of International Operations.

This class critically examines the generic and functional strategies open to multinational enterprises and, through numerous industry and business case studies, seeks to test the applicability of these concepts to actual situations. Each student is expected to prepare a major research paper, and a simulated negotiation is included to help sharpen top management skills crucial for success in international operations.
FORMAT: Seminar
PREREQUISITE: BUSI 5801.03

BUSI 6807.03: International Financial Management.

The objective of this class is to examine models for financial management of cash flows, at least some of which are not domestic. The class explores the implications of balance of payments, interest rates, and inflation rates on foreign exchange rates, as well as the implications of foreign exchange risk on investment decisions.
FORMAT: Seminar
PREREQUISITE: BUSI 5703.04, 5201.03 and 5103.03, strongly recommend BUSI 5801.03

BUSI 6812.03: Foreign Business Program.

A group of MBA students travel to predetermined foreign destinations. The aim of this trip is two-fold: first, to meet with business leaders, government officials and academics in selected countries, and second, to make separate business calls on behalf of specific Canadian firms seeking to do business in these countries. Prior to departure, mission participants will attend a series of lectures on the foreign business environment and familiarize themselves with their Canadian client companies. Following their return, students will present oral and written reports to the companies for which they have carried out a market investigation.

BUSI 6813.03: Management and the Natural Environment: An International Perspective.

A major public issue in the minds of business executives, politicians, scientists, and others is the effect of industrial, agribusiness and other human activities upon the bio-physical environment. The class examines questions which pointedly and forcefully confront multinational

enterprises and explore the choices decision makers must make within a complex array of different economies, markets, cultures, social systems and, perhaps most important, regulatory regimes.
FORMAT: Lecture/seminar
CROSS-LISTING: ENVI 5818.03

BUSI 6901.03: Legal Aspects of Doing Business.
FORMAT: Lecture

BUSI 6902.03: Business and Government, Cross Border Trade.
FORMAT: Lecture

BUSI 6941.03: Applied Topics in Business I.
This course is designed to permit the business school to develop and test new course material. Its content may therefore e different from year to year and between sections. Please consult the department for further information.
FORMAT: Seminar

BUSI 6942.03: Applied Topics in Business, business Ethics.
This course is designed to permit the business school to develop and test new course material. Its content may therefore be different from year to year and between sections. Please consult the department for further information.
FORMAT: Seminar

BUSI 6951.03/6952.03: Research Reading and Conference Class.
This class provides an opportunity for supervised in-depth research on a topic of special interest to the student (proposed by the student and faculty member involved, and approved by the MBA Program Committee). Further description is available at the MBA Office at 494-1814 or mbaoffice@mgmt.dal.ca Deadlines for electronic submission of proposals are September 2, December 1, and April 1 for the following term (one time only). Proposals must be accompanied by name of supervising professor. Once approved by the MBA Program Committee, the student may engage in the project.
FORMAT: Independent Study
PREREQUISITE: All first year core classes (BUSI 5103, 5201, 5305, 5401, 5511, 5551, 5503, 5703, and 5801)

BUSI 6960.03: Internship.
This class is intended to provide students an opportunity to apply in the business environment, the knowledge, skills, and abilities gained in the program. Students must find their own unpaid business placement (at least 130 hours per term, one term only), choose a professor willing to supervise, and submit a proposal (electronically) to the MBA Program Committee. Further description is available at the MBA Office at 494-1814 or mbaoffice@mgmt.dal.ca Deadlines for electronic submission of proposals are September 2, December 1, and April 1 for the following term (one time only). Proposals must be accompanied by name of supervising professor. Once approved by the MBA Program Committee, the student may engage in the internship.
FORMAT: Independent Study
PREREQUISITE: All first year core classes (BUSI 5103, 5201, 5305, 5401, 5511, 5551, 5503, 5703, and 5801)

BUSI 6970.03: Applied Topics in Business III.
This course is designed to permit the business school to develop and test new course material. Its content may therefore be different from year to year and between sections. Please consult the department for further information.

Chemistry

Location: Chemistry Building
Dalhousie University
Halifax, NS B3H 4J3
Telephone: (902) 494-3305
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Email: chemistry@dal.ca
Website: http://www.chemistry.dal.ca

Chairperson of Department
Pincock, J. A.

Graduate Coordinator
Burnell, D.J.

Professors Emeriti
Aue, W.A., PhD (Vienna), FCIC. Chromatography.
Coxon, J.A., BA (Cambridge), MSc, PhD (East Anglia). Electronic spectra of molecules; laser spectroscopy; chemiluminescence.
Knop, O., DSc (Laval), FCIC. Structural and solid-state inorganic chemistry.
Kwak, J.C.T., BSc, MSc, PhD (Amsterdam), FCIC. Colloid and polymer chemistry.

Professors
Bearne, S.L., PhD (Toronto), MDCM (McGill), cross-appointment from Biochemistry and Molecular Biology. Biological chemistry, enzymology, kinetics, enzyme inhibition, drug design, enzyme evolution, proteomics, organic synthesis.
Becke, A.D., BSc (Queen's), MSc, PhD (McMaster), FRSC, FRS, FCIC, Canada Council Killam Research Fellow and Killam Chair in Computational Science. New theoretical and computational methods for the electronic structure of atoms, molecules and solids.
Boyd, R.J., BSc (UBC), PhD (McGill), FCIC, Alexander McLeod Professor of Chemistry. Quantum chemistry; reaction mechanisms; density functional theory and biomolecules.
Burford, N., BSc (Wales, Cardiff), PhD (Calgary), FCIC, Harry Shirreff Professor of Chemical Research and Canada Research Chair in Synthesis and Characterization of Materials. Synthesis and comprehensive characterization of main group compounds.
Burnell, D.J., BSc, MSc (Carleton), PhD (UNB), Faculty of Science Killam Professor of Chemistry. Synthetic and mechanistic organic chemistry
Cameron, T.S., BA, MA, DPhil (Oxon), Director of DALX. X-ray structural studies on inorganic compounds.
Chatt, A., BSc (Calcutta), MSc (Roorkee), MSc (Wat), PhD (Toronto), FCIC, Director of SLOWPOKE and Faculty of Science Killam Professor of Chemistry. Nuclear and bioanalytical methods; trace elements in the environment.
Dahn, J.R., BSc (Dal), MSc, PhD (UBC), Canada Research Chair in Battery and Fuel Cell Materials, NSERC/3M Canada Inc. Industrial Research Chair and cross appointment from Physics and Atmospheric Science. Materials for advanced batteries.
Grindley, T.B., BSc, MSc, PhD (Queen's), FCIC, Carbohydrate chemistry; molecular modeling, synthesis.
Pincock, J.A., BSc, MSc (Manitoba), PhD (Toronto), FCIC, Faculty of Science Killam Professor of Chemistry. Studies on reaction mechanisms involving both ground and excited states.
Shaver, A., BSc (Carleton), PhD (MIT), Vice-President Academic and Provost. Preparing and screening organometallic and metal organic species with chemical and biochemical properties that might lead to useful medical diagnostic and therapeutic agents.
Weaver, D.F., MD, PhD (Queen's), FRCP (C) (Dal), FCIC, Canada Research Chair in Clinical Neuroscience and cross-appointment from the Division of Neurology. Quantum pharmacology, bioinformatics,

computer-aided drug design and medicinal chemistry, neurochemistry.

Wentzell, P.D., BSc (Dal), PhD (Mich State). Chemometrics; sensors; continuous flow analysis.

White, M.A., BSc (Western), PhD (McMaster), FCIC, University Research Professorship, Director of the Institute for Research in Materials and cross-appointment with Physics and Atmospheric Science. Material science, thermal properties of solids.

Zwanziger, J.W., BA (Chicago), PhD (Cornell). Canada Research Chair in NMR Studies of Materials, Director, ARMRC and cross-appointment with Physics and Atmospheric Science. Materials science: Structure, bulk properties, and synthesis.

Associate Professors

Cozens, F.L., BSc (York), PhD (Toronto). Nanosecond laser flash photolysis, physical organic chemistry in homogeneous and heterogeneous media.

Grundy, K.R., BSc, MSc, PhD (Auckland). Synthesis and reactivity of transition metal complexes containing unusual molecular and ionic species.

Guy, R.D., BSc (SFU), PhD (Carleton). Method development for the speciation of toxic metals and organics.

Jakeman, D.L., BSc, PhD (Sheffield), cross-appointment with College of Pharmacy. Applications of enzymes and carbohydrates, protein engineering, medicinal chemistry.

Martin, R.V., BS (Cornell), MSc (Oxford), PhD (Harvard), cross-appointment from Physics and Atmospheric Science. Atmospheric chemistry and the use of satellite and suborbital measurements to improve the understanding of climate and air quality.

Schepp, N.P., BSc, PhD (Toronto). Biologically important reactive intermediates, nanosecond laser flash photolysis.

Stradiotto, M., BSc, PhD (McMaster). Organometallic chemistry.

Thompson, A., BSc (Leicester), PhD (Sheffield). Synthesis and applications of homochiral dipyrromethene complexes; asymmetric catalysis; new methodology for the synthesis of important pyrroles.

White, R.L., BSc (Dal), PhD (McMaster), FCIC. Biosynthesis of natural products and enzymes of secondary metabolism.

Assistant Professors

Andreas, H., BSc, PhD (U of Calgary). Electrochemistry of energy storage, particularly the self discharge of aqueous supercapacitors.

Darvesh, S., BSc, MSc, PhD (UNB), MD (Dal), FRCP (C), cross-appointment from Department of Anatomy and Neurobiology. Drug design, medicinal chemistry, Alzheimer's disease, dementia.

Doucette, A.A., BSc (Dal), PhD (Alberta). Analytical mass spectrometry; biological sample analysis; expression proteomics; multiplexed separations; protein labelling and fluorescence.

Rainey, J.K., BSc (Guelph), MSc, PhD (Toronto), cross-appointment from Biochemistry and Molecular Biology. Biophysical chemistry, protein structure, dynamics and self-assembly.

Turculet, L., BSc (MIT), PhD (Berkeley). Synthetic inorganic and organometallic chemistry and reactivity; new materials synthesis.

Zhang, P., BSc, MSc (Jilin U. China), PhD (Western). Materials science, nanoscience and technology, synchrotron spectroscopy, biotechnological applications of nanocrystals.

Adjunct Professors

Grossert, J.S., BSc, MSc, PhD (Natal), FCIC, Dalhousie University, Halifax, NS. Mass spectrometry and organosulphur chemistry.

Hellou, J., BSc (Montréal), MSc, PhD (UBC), Bedford Institute of Oceanography, Dartmouth, NS. Organic marine environmental chemistry.

Keefe, C.D., BSc (MUN), PhD (Alberta), Canada Research Chair in Molecular Spectroscopy, Cape Breton University, Sydney, NS. Physical Chemistry: Intermolecular Interactions via FTIR Spectroscopy.

Kiceniuk, J., BSc (Alberta), MSc, PhD (UBC)., Dept. of Fisheries and Oceans, St. John's, NL. Environmental chemistry and toxicology.

Marangoni, D.G., BSc (Acadia), PhD (Dal), St. Francis Xavier University, Antigonish, NS. Surfactant technology.

Matta, C., BPharm Sci (Alexandria U, Egypt), Graduate Diploma in Health and Hospital Administration (National Institute of Management, Egypt), PhD (McMaster), Mount Saint Vincent University, Halifax, NS. Computational and theoretical chemistry.

Pacey, P.D., BSc (McGill), PhD (Toronto), FCIC, Dalhousie University, Halifax, NS. Temperature dependence of reaction rates.

Pinto, D.M., BSc (McGill), PhD (Alberta), Institute for Marine Biosciences, Halifax, NS. Bioanalytical chemistry with expertise in the development of analytical technologies for proteomics.

Pottie, I.R., BSc (SMU), PhD (MUN), Mount Saint Vincent University, Halifax, NS. Organic Chemistry.

Ramaley, L., BA (Colorado), MA, PhD (Princeton), FCIC, Dalhousie University, Halifax, NS. Mass spectrometry and chemical instrumentation.

Roscoe, J.M., BSc, MSc (Acadia), PhD (McGill), Acadia University, Wolfville, NS. Gas phase kinetics and spectroscopy.

Soo, E., BSc (U of Sunderland), MSc (McGill), PhD (U of Sunderland), Institute for Marine Biosciences, NRC, Halifax, NS. Analytical chemistry.

Spielvogel, B.F., BS (Geneva College, PA), PhD (U of Michigan), Boroscience Canada Inc., Halifax, NS. Inorganic chemistry.

Syvitski, R., BSc, MSc (Lakehead), PhD (UBC), Institute for Marine Biosciences, Halifax, NS. NMR spectroscopy and MD computer simulations of membranes and membrane-associated proteins.

Werner-Zwanziger, U., Vordiplom (Mathematics), Diploma (Chemistry), PhD (Westfälische Wilhelms-Universität Münster, Germany), Dalhousie University, Halifax, NS. Solid-state nuclear magnetic resonance, ceramics, biomaterials.

Sessional Appointments

Carter, M.D., BSc, MSc (Queen's), BEd (Ottawa), PhD (Dal)
Moya Barrios, R., BSc (U of Havana), MSc, PhD (Dal)
Pearson, K.J., BSc (UCCB), PhD (Dal)
Perrott, A., BSc, PhD (Dal), BEd (Acadia)
Saunders, C.D.L., BSc (Queen's)
Tiedje, K., BSc (Queen's), PhD (Dal)

Postdoctoral Fellows, Research Associates/ Assistants

Al Mughaid, H., BSc (Jordan), MSc, PhD (Dal)
Ba Han, PhD (Yangon U., Myanmar)
Barden, C.J., BSc (James Madison U), PhD (U of Georgia)
Carter, M., BSc, MSc (Queen's), BEd (Ottawa), PhD (Dal)
Chen, B., BSc (Central China Normal U), MSc (Huazhong U of Science and Technology), PhD (UWO)
Cordes, R.E., BSc (Dal), MSc (UBC)
Furue, H., BSc, MSc (Osaka), PhD (Queen's)
Galloway, T., BSc (Wilfrid Laurier), PhD (McMaster)
Gayo, F.G., BSc (Qufu Normal U, China), MSc (Beijing Institute of Technology, China), PhD (Dal)
Gillis, M., BSc, MSc (UNB), PhD (Sask.)
Jahan, N. BSc, MSc (Karachi U, Pakistan), MPhil, PhD (HEJ, Karachi U, Pakistan)
Johnson, M., BSc (Dal), MSc (UWO)
Lamsabhi, A.M., BSc, MSc, PhD (Cadi Ayyad U, Morocco)
Lu, E., BSc (Wuhan U of Technology), PhD (Dalian U of Technology)
McDonald, C., BSc (Dal), PhD (U of Alberta)
Paul, N., BSc, MSc (Kurukashetra U., Kurukshetra, Haryana, India), PhD (Bundelkhand U., JHansi, UP, India)
Pincock, A.L., BSc, MSc (Manitoba) BFA (NSCAD)
Sadeghi-Khomami, A., BSc (U of Mashhed), Phd (U of Nottingham)
Weaver, C., BSc, MSc (Queen's)
Wu, F., PhD (Research Institute of Petroleum Processing, Beijing, P.R. China)
Zwicker, B., BSc (Dal)

Visiting Professor

Gauld, J.W., BSc (U of Queensland), Honours (NTU), PhD (ANU)

Visiting Scientists

Fukushima, M., DSc (Tohoku U, Japan), Ishinomaki Senshu U, Ishinomaki, Miyagi, Japan
Wu, J., BSc (Anqing Normal College, China), MSc, PhD (Nanjing U, China)

Programs leading to MSc and to PhD degrees are offered. Research for these degrees can be undertaken in analytical, inorganic, organic, physical/theoretical chemistry or combinations thereof.

I. Admission Requirements

Candidates must satisfy the general requirements for admission to the Faculty of Graduate Studies. It is recommended that all students from outside Canada submit the results of the advanced subject Graduate Record Examination in Chemistry. In most cases this will be made a precondition to consideration of the student's application for admission. For those whose first language is not English a minimum TOEFL score is required (see Section 2.4 in the Faculty of Graduate Studies regulations).

General Regulations

All graduate students are required to carry out novel, original research. In addition, all graduate students are required, as part of their training, to instruct in the undergraduate laboratories, to present and participate in departmental graduate student seminars, and to attend invited speaker departmental seminars. The Department will hold an annual meeting at which time it will review the work of all graduate students. Permission to continue will be contingent upon a satisfactory decision by the Department.

Further details of degree regulations are presented in the Graduate Students' Handbook, which may be obtained from the Departmental Office.

II. Degree Options

A. MSc Degree

Full-time Program

Two full-credit classes, or the equivalent, and one departmental graduate student seminar, together with the presentation and oral defence of a thesis based on original research are required. Faculty regulations permit an MSc candidate to graduate after 12 months of resident study. Experience has shown that most MSc candidates in the Department require at least 20 months to complete their work. Financial support is available for up to two years.

Part-time Program

The full-time MSc class requirements and thesis regulations apply. The thesis must be supervised by a member of the Department. Stipends are not available from the Faculty of Graduate Studies.

B. PhD Degree Program

Students with a completed Master's degree are normally required to pass two additional full credits of classes and present two departmental graduate seminars. A PhD qualifying examination must be completed successfully within two years. Original research, together with preparation and oral defence of a thesis, is required.
For the minimum time required to complete the program, see Section 4. Financial support is available for up to four years.

III. Class Descriptions

Core graduate classes (5000) and advanced classes (6000) are offered. The core classes constitute the main framework of a student's formal class work, and are designed to be broad-based but at an advanced level. They are intended to help the student gain a wide understanding in several major branches of chemistry and thus students are strongly encouraged to take some classes outside their area of specialization. Specialized classes provide the opportunity for in-depth study of selected topics which are more closely related to the student's research area.

CHEM 5101.03: Topics in Advanced Main Group Chemistry.

A brief overview of the fundamental aspects of preparation, structure and bonding for familiar systems is followed by examination of selected topics in detail. An emphasis is placed on apparently novel structure and bonding in comparison to the chemistry of carbon leading to conclusions on a more general bonding model for the elements of the main group.

CHEM 5102.03: Organotransition Metal Chemistry.

Organotransition metal chemistry has grown over the last several decades into one of the most important areas of research and development in inorganic chemistry. In this class the most important types of organic ligands and their bonding characteristics are surveyed, as are the most important reaction pathways such as migratory insertion, oxidative addition, nucleophilic addition, etc. The class concludes by examining homogeneous catalysis by organotransition metal complexes.

CHEM 5103.03: Spectroscopic and Structural Methods.

In this class, a selection of techniques commonly used in elucidating the structures of inorganic compounds and/or materials is surveyed. Topics to be covered may include, but are not restricted to: nuclear magnetic resonance spectroscopy; X-ray diffraction methods; vibrational spectroscopy; and magnetic measurements.

CHEM 5201.03: Advanced Topics in Separations.

Chemistry started as the science of separations and separations are still its most prominent feature in most laboratories around the world. This class deals mainly with chromatography and associated techniques; in particular, gas chromatography in its regular, capillary and supercritical forms, high-pressure liquid (including ion) chromatographies, capillary electrophoresis, and gas and liquid chromatography combined with other instrumental techniques such as mass spectrometry. The original ideas behind the design of separation media and detection modes are emphasized, and their consequences for the analysis of living and environmental systems.

CHEM 5301.03: Theory of Chemical Bonding.

This class surveys contemporary methods for electronic structure calculations. The emphasis is on the qualitative features and physical basis of molecular orbital theory and its application to chemistry. Empirical, semi-empirical, and ab initio methods are included. Each student is expected to undertake a computational project relevant to her or his research interests.

CHEM 5303.03: Physical Properties of Materials.

The class will provide a broadly based introduction to the physical properties of materials, including optical, thermal, electronic, magnetic and mechanical properties. In addition, it will provide more in-depth coverage of matters concerning lattice dynamics and related phononic properties of solids.

CHEM 5304.03: Kinetics and Catalysis.

This class relates the properties of molecules in motion to the rates of chemical changes. Collision, transition state and diffusion theories are applied to significant industrial, biological and atmospheric process. Photochemistry, and its converse, luminescence, are interpreted. Mechanisms of catalyst activity are discussed. In assignments, students apply theories to systems of their own choice.

CHEM 5305.03: Introductory Statistical Thermodynamics.

The principles of statistical mechanics are introduced and the relationship between the laws of thermodynamics and the underlying microscopic processes is examined. Wherever possible applications to chemical systems are emphasized, and overview is given of modern techniques, with particular attention to computer simulation.

CHEM 5401.03: Synthesis in Organic Chemistry.

This class is designed to allow the student to understand modern synthetic organic chemistry. It includes discussion of the main techniques for carbon-carbon bond formation and for functional group interconversion. Concepts in organic synthesis are introduced through study of syntheses of a number of molecules of biological and chemical interest. Students will review at least one publication from the current literature, give an oral presentation and write a review paper.

CHEM 5402.03: Organic Structure Determination.

This class uses all spectral techniques in a problem-based approach to teach methods for the determination of structures of organic and inorganic compounds, with the emphasis being on the former. The class material mainly focuses on nuclear magnetic resonance spectroscopy with some attention to mass spectrometry. Topics include proton, carbon, and heteroatom chemical shifts and coupling constants, relaxation, dynamic NMR, and one-dimensional and two-dimensional experiments.

CHEM 5403.03: Organic Reaction Mechanisms.

The fundamental concepts of bonding, structure, and dynamic behaviors of organic compounds are discussed. Methods for determining the mechanisms of organic reactions are discussed. Topics include applications of kinetic data, linear free energy relationships, acid and base catalysis, concerted reactions and the importance of orbital symmetry, steric effects, solvent effects, and isotope effects.

CHEM 5502.03: Polymer Science.

This class will cover aspects of synthesis, analysis, characterization, structure and uses of synthetic and naturally occurring macromolecules. Emphasis will be on the application of standard methods of organic synthesis, analytical separations, and physico-chemical characterization. In addition, students will carry out independent literature projects.

CHEM 5504.03: Diffraction Techniques in Solid State Chemistry.

All chemical elements and compounds can exist as crystalline solids. This class studies the arrangements of atoms and molecules in such solids and examines the methods used to determine these structures. Particular emphasis is placed on the techniques of X-ray crystallography.

CHEM 5509.00: Graduate Student Seminar I.

All MSc and PhD students are required to participate in the Graduate Student Seminar program every year. MSc and PhD students will be required to prepare and present one Departmental Seminar within the first two years of study, normally in the winter term of the second year. Seminar I shall be formatted as a scientific research lecture and shall focus on a chemistry topic that is in the current chemical literature and not related to the student's research topic. Graduate Student Seminar I has the purpose of broadening the graduate student's outlook and understanding of Chemistry. Evaluation will be based on preparation, presentation skills, scientific content, ability to field questions and regular attendance. Graded pass/fail.

CHEM 5601.03: Principles of Biomolecular and Drug Molecule Design.

An introductory level course in biomolecular design, drug design, and medicinal chemistry. The class covers both general principles of drug design and biochemical considerations in drug design. The fundamental goal of the course is to give student the necessary tools "to take a human or veterinarian pathological problem and to sit down and initiate the process of designing new chemical structures as putative therapeutics for the disease in question." Students in chemistry are strongly recommended to take Chemistry 3601 prior to registering in this class.
FORMAT: Lecture, 3 hours per week
PREREQUISITE: CHEM 2402 or permission of the instructor
CROSS-LISTING: CHEM 4601

CHEM 6106.03: Advanced X-Ray Crystallography and Group Theory.

This is a class for specialist crystallographers. Topics covered include: the theory of diffraction and the theory and design of diffractometers; modern Patterson methods of structure determination, modern "Direct Methods" and the relationship between Patterson and Direct methods; least-squares refinement, absorption and disorder; incommensurate structures and the methods used to examine them; constrained and restrained refinement, the theory and practice; methods of libration analysis.
PREREQUISITE: CHEM 5504

CHEM 6199.03: Special Topics in Inorganic Chemistry.

CHEM 6203.03: Environmental Chemistry.

This class is designed to illustrate the applications of basic chemistry to the characterization of environmental systems. The basic concepts of equilibria, kinetics, and mass transport are used to develop models for the distribution of organic chemicals in environmental systems as diverse as sewage treatment plants, room air quality, freshwater lakes, and bioaccumulation of pollutants by fish. The computational and graphical aspects of the models are developed using simple spreadsheets. The case studies discussed in the lectures are selected to illustrate both environmental interactions and analytical methodology. The most important topics covered are: characteristics of environmental systems, box models of the environment, fugacity description of organic interactions, QSARs, acid/base equilibria for natural waters, Eh-pH diagrams, and metal speciation.

CHEM 6204.03: Analytical Radiochemistry.

This class introduces basic concepts of nuclear chemistry and nuclear analytical methods. The class includes: discovery of radioactivity; nuclides and natural decay chain; types of radioactive decay; nuclear reactions; research reactors; instrumental, preconcentration and radiochemical neutron activation analysis; and two laboratory sessions on NAA.

CHEM 6205.03: Chemometrics.

This class considers the application of mathematical, statistical and computer-based methods to chemical measurements. Topics include descriptive statics, probability, propagation of error, experimental design, analysis of variance, experimental optimization, regression (linear and nonlinear), multivariate calibration, digital filtering, Fourier transforms, and principal components analysis. Topics are often tailored to class interests. Some exposure to computers is assumed, but programming experience is not essential.

CHEM 6301.03: Advanced Electronic Structure Theory.

This class is primarily concerned with advanced electronic structure methods for the inclusion of the effects of electron correlation. Topics, chosen from the current literature, include configuration interaction, coupled-cluster methods, perturbation theory and density functional theory. This class is intended for students engaged in doctoral studies in theoretical chemistry.
PREREQUISITE: CHEM 5301

CHEM 6304.03: Computational Kinetics.

This class will offer students experience in the application of computers to current problems in chemical kinetics. The central objective will be the simulation of complex chemical processes by computer. Building blocks will include the calculation of key parts of potential energy surfaces, transition state theory calculations, Rice-Ramsperger-Kassel-Marcus theory and the solution of combinations of differential rate equations by finite difference techniques. Students will use some commercial programs and will write some programs themselves.

CHEM 6312.03: Colloid and Surface Science.

This is an introduction to the study of colloidal systems and interfaces. The student is expected to have a background in thermodynamics at the undergraduate level since a review of the thermodynamics of electrolytes is included in this class. Topics covered include nomenclature of colloidal systems, the thermodynamics treatment of interfaces and adsorption, the electrical double layer, colloid stability, association colloids, and polymer solutions. A number of applications in various industrial processes and resource extraction are discussed. Assessment is through regular take home assignments, literature reviews, a special project, and a written final examination.

CHEM 6313.03: Special Topics in Solid State Chemistry.

This class is intended to introduce interested students to the solid state. The prerequisites are good grounding in thermodynamics and mathematical methods. The class introduces the basics of solid state (lattice types, phonons, lattice models) and then moves on to introduce techniques used to investigate the solid state. These concepts are then applied to a variety of problems. The text followed is "Solid State Physics" by C. Kittel, and a number of other books are used for reference material. The student is evaluated on problem assignments, one or two seminars and a three-hour closed-book final examination.

CHEM 6316.03: Theory of Modern NMR Experiments.

The principles behind many of the common 1-D and 2-D NMR experiments are discussed. An introduction to density matrix theory, the product operator formalism and their application to modern NMR spectroscopy are discussed. As well, average Hamiltonian theory and some applications in solid state NMR are covered.

CHEM 6404.03: Organic Photochemistry.

This class covers the fundamentals of the properties and reactivity of the excited states of organic molecules in solution. The first part deals with transitions between states including the process of absorption, fluorescence, phosphorescence, internal conversion, intersystem crossing and chemical conversion. The approach here is qualitative and descriptive rather than quantitative and theoretical. Kinetic schemes using the steady-state approach are used to discuss quantum yields. The second part is on selected examples of organic functional group reactivity.

CHEM 6406.03: Natural Products.

This class introduces the major groups of natural products, including polyketides, alkaloids, peptide antibiotics, terpenes and shikimate metabolities. Analysis of natural product structure is emphasized, and characteristic structural fragments are related to primary biosynthetic precursors. Strategies, techniques and mechanistic reasoning used to elucidate the biosynthetic pathways of natural products are covered. Biosynthetic studies from the current scientific literature are discussed using several commercially important natural product pharmaceuticals as examples. Students are evaluated on problem assignments, a term test, one or two class presentations of topics from the research literature, and a written final exam.

CHEM 6409.03: Carbohydrate Chemistry.

This class provides an outline of the structures, functions and preparation of carbohydrates. An introduction to carbohydrate structure and nomenclature is followed by consideration of the principles and methods of conformational analysis, with emphasis on those that apply to carbohydrates. Synthetic topics discussed include glycoside synthesis, blocking groups, neighbouring group participation, nucleophilic substitution, glycals, and others that vary from year to year. The structures and functions of a few of the most interesting biologically important oligosaccharides and polysaccharides are considered.

CHEM 6499.03: Special Topics in Organic Chemistry.

CHEM 6501.03: Electronic Instrumentation for Scientists.

This class starts with basic electrical concepts and describes simple ac and dc circuits. Semiconductors are introduced, followed by a discussion of power supplies and the various types of amplifiers. The various number systems and circuits (gates and flip-flops) used in digital circuits are discussed. Finally digital data transmission, analog-to-digital and digital-to-analog conversion, and computer basics are explored. Chemical instruments are used as examples whenever possible. Practical aspects of electronics such as basic measurements, the use of various electronic instruments, reading circuit diagrams, and troubleshooting are emphasized. No knowledge of physics beyond the first year is required.

CHEM 6505.03: Biological Mass Spectrometry.

This class offers a thorough treatment of modern mass spectrometry. The first part of the class covers the design of modern instrumentation with the emphasis on use in bioanalytical chemistry. The second major topic is an examination of some fundamental physics and chemistry of ions in the gas phase. The third part is a summary of modern applications with particular attention to the roles of mass spectrometry in drug discovery, proteomics, and environmental chemistry.

CHEM 6509.03: Graduate Student Seminar II.

All graduate students enrolled in the Doctoral program will be required to present a graduate student seminar on their research topic during the final two years of study. Seminar II will normally be presented in the fall term of the fourth year of study. Graduate Student Seminar II has the purpose of giving the senior PhD student an opportunity to present a Departmental seminar on their research work. Evaluation will be based on preparation, presentation skills, scientific content, ability to field questions and regular attendance. Graded pass/fail

CHEM 9000.00: MSC Thesis.

CHEM 9530.00: PhD Thesis.

Civil and Resource Engineering

- **Civil Engineering**
- **Mineral Resource Engineering**

Main Office
Location: "D" Building, Room D215
Telephone:(902) 494-3241
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Email: cregrad@dal.ca
Website: http://civilandresource.engineering.dal.ca
Mineral Resource Office
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Department Head

Zou, D.H., BSc (CUMT, China), PhD (UBC), PEng

Professor Emeritus

Jaeger, L.G., BA, MA (Cantab), PhD (London), DSc (London), DEng (Carleton, Memorial, TUNS)(hc), PEng

Professors

Ali, N.A., BSc (Baghdad), MSc, PhD (N. Carolina State), PEng. U.G. Program Chair. Flexible pavement, highways, pavement design and performance, transportation.

Fenton, G.A., BEng., MEng. (Carleton), M.A., PhD, (Princeton), PEng, cross-appointment with the Engineering Mathematics Department.

Gagnon, G.A., BScE (Guelph), PhD (Waterloo), PEng, Associate Director, Centre for Water Resources Studies. Cross-appointment with the School for Resource and Environmental Studies. Water and wastewater treatment, water quality, environmental engineering.

Islam, M.R., Dip. Ing. (Algeria), MSc (Alberta), PhD (Alberta).

Rockwell, M.C., BEng (Petro), MEng, PhD (TUNS), PEng. Petroleum engineering, reservoir engineering, mine waste management, mine production engineering, ocean mining.

Satish, M. G., BSc, BECivEng (My.), MEng, PhD (Concordia), PEng, Associate Dean, Graduate Studies and Research. Water resources engineering, numerical modeling of flows, system optimization, open channel flow.

Taheri, F., BEng, MASc, PhD (TUNS), PEng. Advanced composite materials, finite element methods (elastic, plastic), fracture mechanics and fatigue, impact and stability of structures.

Trottier, J.F., BScA, PhD (Laval), PEng, Director, Nova Scotia CAD/CAM Centre. Canada Research Chair on Structural Health Monitoring and Innovative Materials. High performance concrete, durability of civil engineering structures, nondestructive testing (ground penetrating radar).

Zou, D.H., BSc (CUMT, China), PhD (UBC), PEng, Rock mechanics, nondestructive rock bolt testing, mine design, numerical modelling, tailing disposal, slope stability analysis, well bore stability, geohazards prevention.

Research Professor

Waller, D.H., BEng (TUNS), DIC (London), PhD (Dal), PEng.

Associate Professors

Hansen, D., BScE (Guelph), MScE (UNB), PhD (Ottawa), PEng. Hydrology, river hydraulics, flow through porous media, municipal water systems.

Hart, W.C., BSc (Ohio Wesleyan), MA (Indiana), PhD (Dal), Director, Centre for Water Resources Studies. Joint appointment with the Department of Process Engineering and Applied Science.

Hill, J.D., BSc, MSc (Acadia), PhD (UWO). Mining geology, time domain reflectometry, acid rock drainage.

Lake, C., BEng (TUNS), PhD (UWO), PEng. Graduate Studies Coordinator. Geotechnical engineering, geo-environmental engineering, geosynthetics performance.

Liu, L., BSc (Nankai), MSc (Peking), PhD (Regina). Geo-Environmental engineering, environmental engineering, environmental modelling and decision-making.

Liu, Y., BScE, MScE (Xi'an), PhD (UNB), PEng., Co-op Coordinator. Structural analysis and design, applications to masonry structures, advanced strength of materials, application of the finite element method.

Newhook, J.P., BEng, MASc, PhD (TUNS), PEng, Fibre reinforced polymers, concrete, bridge engineering, structural health monitoring, design and analysis.

Assistant Professors

Flint, I., PhD (UBC), MASc (Toronto), BSc (Toronto), BASc (Toronto). Mining Separation process, hydrocarbon-water, soils remediation, flotation, graphite processing, simulation and modelling

Thorburn, J., BSc (UNB), MSc (Alberta), PhD (Dal), PEng. Structural analysis and design, design of steel structures.

Walsh, M., BEng (TUNS), MEng (McGill), PhD (Dal), PEng. Membrane technology for water and wastewater treatment, industrial chemical program management and wastewater reuse applications, biological processes for water and wastewater treatment.

Adjunct Professors

Akhavi, MS, BSc, MSc (Colorado), PhD (Iowa)

Butt, S.D., BEng, MSc (Memorial), PhD (Queens), PEng. Mining Technology, geomechanics, sub surface imaging, reservoir monitoring.

El-Jabi, N., BASc (Sherbrooke), MASc, PhD (U of Montreal, Poltechnique), PEng

Forrester, D.J., BSc, PhD (Nottingham), PEng. Geotechnical, rock mechanics, mining and mine environment management.

Jones, D.S., BEng (TUNS), MBA (Western Ontario), PhD (TUNS), PEng. Rock mechanics, ground control, mine design, ventilation.

Koko, T., BSc (Nigeria), MEng (Nigeria), PhD (UBC), PEng

Adjunct Associate Professors

Forgeron, D., BEng (TUNS), PhD (Dal), PEng

Kasemets, J.T., BEng (Royal Military College), MEng (Alberta), MBA (Ottawa). Blasting, explosives, rock breaking.

Kenny, S., BEng, MEng, PhD (Memorial), PEng

Mann, H., BSc (SMU), MSc, PhD (UWO)

Pegg, N., BSc (Guelph), MASc (UBC), PhD (TUNS), PEng

Adjunct Assistant Professors

Caissie, D., BASc (Moncton), MASc (Moncton), PhD (Dal), PEng

Gibson, M., BA (England), MSc, PhD (Glasgow)

Limaye, V., BE (India), MASc (Dal), PhD (Dal), PEng

Morcous, G., BEng (Cairo), MASc (Cairo), PhD (Concordia), PEng

Civil Engineering Program

I. Introduction

Civil Engineering is concerned with the engineering (planning, design and construction) of systems of constructed facilities related to the needs of society. The scope and complexity as well as the interdisciplinary involvements of Civil Engineering continues to increase rapidly with the development of modern science and technology and the population growth with its spiraling demands upon the air-land-water environment. The preparation of the Civil Engineering student is aimed toward meeting

these challenges through innovative application of known principles, creative research to discover new approaches, and imaginative design to fulfill society's needs.

Civil Engineering graduates are found in responsible engineering and administrative positions in industry and government. Some become consultants in planning, design or construction of engineering projects or in specialized fields where the application of research to the solution of practical problems is important. The professional practice of a Civil Engineer includes the conception, design, construction, operation, and maintenance of private and public projects. Included in this are bridges, buildings, highways, airports, railroads, harbors, docks, subways, tunnels, water supply and purification systems, sewage collection and treatment facilities, water power developments, and Petroleum Engineering. See the Engineering section for details of Master's and Doctoral programs.

II. Class Descriptions

(Not all classes are offered every year. Please consult the current timetable for this year's offerings)

CIVL 6000.03: Directed Studies in Civil Engineering I.

This class offers the Graduate Student an opportunity to undertake a study in a specific area of interest that is not covered in the regular class offerings. The student chooses to work under the supervision of a Faculty Member in the Department. This class is normally available to a Graduate Student enrolled in a Master's Degree Program.

CIVL 6101.03: Advanced Strength of Materials.

The class introduces tensor mathematics. The governing equations of an elastic solid are developed in various coordinate systems. Engineering problems such as plane problem, St. Venant, bending, torsion, and extension of bars are treated. Displacement, stress field and Airy function and some numerical methods for obtaining solutions are other methods that are covered. The class explores various failure criteria and their application. Theory of anisothropic elastic continuum concludes the class.
PREREQUISITE: Undergraduate senior level Strength of Materials or equivalent

CIVL 6104.03: Advanced Hydraulics.

An advanced study of hydraulics in relation to engineering problems. Flow principles; surface and form resistance; turbulence, boundary layer concepts. Model similitude; tidal power plants; gas-lift pumps.

CIVL 6105.03: Open Channel Hydraulics.

Basic concepts of fluid flow; the energy principle in open channel flow; the momentum principle in open channel flow; flow resistance; flow resistance in nonuniform flow computations; channel controls; channel transitions; and sediment transport.

CIVL 6106.03: Coastal Hydraulics.

Review of water waves. Translatory; tsunamis; tidal waves; gravity waves; wave diffraction and refraction and focusing; littoral currents and drift; cusps; winter and summer beaches; rip tides; sand by-passes; beach feeding; sand pumping; groynes; jetties and breakwaters.

CIVL 6108.03: Graduate Seminar - Master's Level.

This seminar class is designed to provide graduate students with the opportunity to search the literature for information on current topics related to their projects/thesis. All graduate students pursuing MEng and MASc degrees in the Civil Engineering program are required to take this class and offer their findings, orally in one presentation to the faculty members of the department and students, four months prior to the completion of their program. This presentation will be followed by a question and answer session. Graduate students might also be asked to submit a written version of their presentations (or a hard-copy of their presentation slides) to the Graduate Coordinator of their department. This seminar class will be offered twice each academic year in the format of an end-of-term conference in Fall and Winter semesters, respectively. Evaluation will be based on preparation, presentation skills, scientific content, ability to field questions and regular attendance. Graded pass/fail.
NOTE: (1)This is a required class for all Master students in the Department of Civil and Resource Engineering: (2)Registration of this class is required only for the term during which students present their research findings.

CIVL 6115.03: Design of Water Treatment Plants.

Evaluation of water quality characteristics and synthesis of unit operations into plants designed to modify those characteristics. Design aspects of flocculation, coagulation, precipitation, sedimentation, filtration and disinfection are included.
PREREQUISITE: CIVL 4440.03 or equivalent

CIVL 6116.03: Biological Waste Treatment.

A study of fundamental principles of microbiology as applicable to domestic waste treatment. Activated sludge processes, trickling filters, aerated lagoon, stabilization ponds, disinfection and anaerobic treatment.
PREREQUISITE: CIVL 4440.03 or equivalent

CIVL 6117.03: Water Quality Management.

Water quality requirements for various uses: factors affecting water quality; behaviors and fate of pollutants in treatment plants and receiving waters and considerations involved in selection from alternative methods of water quality control.

CIVL 6119.03: Highway Materials.

A study is made of the properties of subgrades and of how they influence the performance of pavements. The purpose and properties of base and sub-base will be considered. Bituminous materials and aggregates are tested and combined to give desirable mixes.

CIVL 6120.03: Advanced Traffic Engineering.

Principles of planning and advanced traffic engineering with special reference to criteria for optimum cycle length; geometric design of highways and interchange design principles; benefit-cost considerations. This class will involve a term problem on interchange design and preparation of working drawings.

CIVL 6126.03: Foundation Engineering I.

Geotechnical aspects of shallow and deep foundation design are presented. Current subsoil investigation and field methods for foundations of structures will be reviewed. Bearing capacity and deformation of both shallow and deep foundations are examined with respect to analytical, numerical and empirical methods.

CIVL 6127.03: Foundation Engineering II.

The class deals with the design and construction of deep foundations. Design considerations such as, bearing capacity and settlement, are considered. The use of total and partial factors of safety are discussed. Field load tests and their interpretation are included as well as a review of inspection procedures for deep foundations.

CIVL 6134.03: Advanced Highway Geometric Design.

This class deals with the principles of Geometric design controls and criteria with special reference to capacity controlled designs. Grade separated intersections and fully developed interchanges will be discussed in relation to traffic volumes. Computer-based design of freeway and ramp junctions will be considered in detail.

CIVL 6135.03: Groundwater Chemical Quality.

This class provides an in-depth study into the chemical quality of groundwater. As water passes through the various stages of the hydrologic cycle, its composition changes. This class will explore these changes with particular reference to: (1) the types of inorganic and organic constituents dissolved in water and their significance; (2) the suitability of water quality data and its presentation; (3) the various processes that control the behaviour of dissolved substances in groundwater; (4) the evolution of groundwater quality; (5) the more commonly used groundwater quality models; (6) basic chemical properties, transport mechanisms, retardation and restoration of organic contaminants in water; and (7) point of use water treatment.
PREREQUISITE: CIVL 3450.03 and 4410.03. The latter may be taken concurrently.

CIVL 6137.03: Advanced Soil Mechanics.

This class deals with the stress-strain behavior and its mathematical representation. The aspects considered include nonlinear elastic and elasto-plastic behavior of soils with particular reference to the critical state theory. Application of several well-established soil models for solving practical problems are discussed.

CIVL 6139.03: Transport Operations.

This class is an introduction to the operation of transportation services at the urban and regional levels. Surveys and data collection, development of computerized data bases, and elements of travel forecasting; trip generation, trip distribution, modal split, trip assignment are covered. Operational characteristics of public transportation, airports and freight distribution systems, and performance evaluation are discussed. Environmental, energy and safety implications of transportation systems, and existing policies are reviewed.

CIVL 6141.03: Modeling of Groundwater Systems.

Basic concepts in analytical and numerical modeling of groundwater systems are introduced. Fundamental equations for flow in aquifers and mathematical statement of the groundwater forecasting problems are studied. The hydraulic approach to flow in aquifers and the continuum approach to flow through porous media are discussed. Modeling techniques for groundwater quality problems dealing with pollutant movement due to hydrodynamic dispersion are also studied.
PREREQUISITE: CIVL 4410.03

CIVL 6142.03: Pavement Design and Management.

This class covers all aspects of flexible, (asphalt concrete) and rigid (portland cement concrete) pavements design methods. It includes structural pavement design of new pavements and overlay, including mechanistic. (i.e., shell, Asphalt Institute, PCA), empirical, (i.e., AASHTO, Ontario) and performance prediction - oriented, (i.e., VESYS, DAMA, LTPP - observation) methods. It also includes the recent research efforts in monitoring pavement performance.

CIVL 6143.03: Modelling of Groundwater Systems II.

This class builds on the fundamental concepts introduced in Modelling of Groundwater I. Emphasis will be placed on numerical techniques for studying contaminant transport in groundwater.
Numerical aspects of modelling, parameter identification and optimization will be discussed along with modelling of chemistry coupled to transport, dispersion theory and transport in fractured media.
PREREQUISITE: CIVL 6141.03

CIVL 6144.03: Geo-Environmental Barrier Design.

Geo-environmental aspects of waste management are examined with emphasis on the design of barrier systems to provide long term protection against groundwater contamination. A major focus is the integration of engineering design and dydrogeologic considerations relative to contaminant transport through engineered barrier systems and natural soils.

CIVL 6145.03: Probability Concepts in Civil Engineering Planning & Design.

This class introduces concepts related to the role of probability in civil engineering, uncertainty in real-world information, design and decision making under uncertainty.
Examples will be derived from planning and design of airport pavements, hydrologic design, of structures and machines, geotechnical design, construction planning and management, photogrammetric and geodetic surveying measurements.
The class will discuss analytical models of random phenomena, functions of random variables, estimating parameters from observation data, empirical determination of distribution models, regression and correlation analyses, elements of quality assurance and acceptance sampling.

CIVL 6147.03: Advanced Theory of Structures.

This class provides graduate students and practicing engineers with a knowledge necessary to make safe and efficient use of computer programs designed to analyze frame type structures. The displacement method is studied in detail with applications to trusses, continuous beams, complex rigid frames, grillages and space frames. The theoretical knowledge gained is put into practice through commercially available codes. Throughout the class, practical 'real-life' problems constitute the assignments and projects.
PREREQUISITE: CIVL 3510.03 or equivalent

CIVL 6148.03: Application of Finite Element Method I (Linear Systems)

This class introduces the theory and implementation of the analysis procedures used in the linear, static, and dynamic finite element analysis systems. First, the continuum mechanics formulation is presented. For finite element discretization, one-, two-, and three-dimensional elements are described. Finally, a selected number of equation and eigenvalue solvers are compared.
PREREQUISITE: CIVL 3700.03 or equivalent

CIVL 6149.03: Application of Finite Element Method II (Nonlinear Systems).

This class introduces the theory and implementation of the analysis procedures used in geometric and material nonlinear finite element analysis systems. Problems in plasticity, impact, contact and viscoelasticity are treated. Numerical solutions pertinent to nonlinear systems are explored. Various topics and algorithms such as the reduce integration, hour-glass and Arc Length Automatic Stepping method are also reviewed. The students examine the above concepts by exploring a set of industrial applications.
PREREQUISITE: CIVL 6148.03 or 4540.03

CIVL 6150.03: Dynamics of Structures.

This class covers fundamental analysis methods for the behavior of structures and structural elements subjected to dynamic loading. Comprehensive study of single-degree-of-freedom systems followed by solution of multi-degree -of-freedom systems with particular reference to response of multi-story structures to earthquake loading is covered. An introduction to random response and stochastic analysis of structural dynamics problems are also given.

CIVL 6151.03: Bridge Engineering.

This class provides an introduction to bridge engineering, specifically discussing the aspects of loading, analysis and design relevant to short and medium span bridges. Reference is made to current Canadian bridge design codes. Analytical methods appropriate for bridge superstructures is presented, including computer methods. The structural design of steel, reinforced concrete and prestressed concrete bridge systems are discussed.

CIVL 6152.03: Behavior and Design of Steel Structures.

Advanced concepts of the behavior and design of steel members and frameworks are presented, emphasizing the rationale for current steel code design criteria. Topics include torsion, plate stability, connection design, fatigue and frame behavior.
PREREQUISITE: CIVL 4520.03 or equivalent

CIVL 6153.03: Fibre Reinforced Plastics (FRP).

This class begins with a review of test methods, properties and production methods of the fibre and polymer components of fibre-reinforced laminates and of fabricated composite laminates. This is followed by the development of the macro-mechanical and micro-mechanical analysis techniques for the design of composite laminae and a study of the strength criteria used in design procedures.
PREREQUISITE: Senior level mechanics of materials class

CIVL 6155.03: Advanced Concrete Technology.

This class provides an in-depth study of the various factors affecting the behavior and performance of concrete. Strength of concrete, permeability and durability, deformation and cracking, curing, admixtures, temperature effects and specialized testing procedures are among the topics presented. High performance concrete, polymer concrete and roller compacted concrete are also studied.

CIVL 6156.03: Fibre Reinforced Cement Composites.

The purpose of this class is to introduce the student to various portland cement-based fibre composites and to provide information on their constituent materials, fabrication, mechanical performance and applications. Interaction between fibres and matrix, behavior under tensile, flexure, fatigue and impact loading, properties of freshly mixed and hardened fibre reinforced concrete are studied. Special fibre reinforced cementitous systems like SIFCON and different application procedures like shotcreting are also covered.

CIVL 6157.03: Advanced Reinforced Concrete Structures.

A study of principles of reinforced and prestressed concrete design and the application of prestressed concrete to buildings, bridges and prefabricated structures. Yield line theory of concrete slabs, design of structures for earthquake loads, structural failure and methods of repair are covered.
PREREQUISITE: CIVL 3520.03, CIVL 4510.03

CIVL 6159.03: Form and Process in Alluvial Channels.

This class begins with various aspects of fluvial geomorphology from a civil engineering point-of-view. It then moves on to discussion of hydraulic resistance based on quantitative estimates of channel roughness, regime concepts for artificial and natural rivers, uses of boundary shear stress and unit stream power in bed-load estimations, the hydraulics and statistics of suspended sediment, numerical versus physical modelling, and a review of case histories of responses of rivers to human activity. The hydraulics of fish habitat assessment is also considered. The application of HEC-RAS to a local brook is part of the class.
PREREQUISITE: CIVL 3300.03, 3310.03

CIVL 6160.03: Energy Methods and Stability in Elastic Structures.

Energy methods are an important tool in elastic structural analysis and design. Many traditional methods, as well as more advanced finite element analyses for determining displacements and stresses, are based on energy principles. This class will introduce energy methods and look at several applications in structural engineering, including determination of the elastic stability limits of structures and the development of displacement matrix methods of analysis.

CIVL 6161.03: Marine Geotechnics.

This class presents the basic principles of soil mechanics for the marine setting. The class provides a basic overview of marine geology and oceanography as applied to problems in ocean engineering, presents special marine geotechnical measurements and techniques, reviews geotechnical properties and soil mechanics techniques required for marine investigations, and introduces the student to marine geophysical methods.
PREREQUISITE: CIVL 3100.03

CIVL 6162.03: Groundwater and Wells.

This class deals with those aspects of groundwater resource assessment, development and protection pertaining to the design of water wells intended to function as reliable sources of potable water in the long-term. It includes detailed consideration of drilling methods, well design, aquifer testing, field-data interpretation, strategies for well-head protection, and the essentials of site assessment.
PREREQUISITE: CIVL 4410.03

CIVL 6163.03: Design and Analysis of Plates and Shells.

This class deals with the derivation and the solution of the differential equations of plates and shells. The solutions are used for the design and analysis of practical problems. The topics covered are: plates in Cartesian coordinate system with various boundary and load conditions, introduction of yield line theory, circular plates, plates on elastic foundation, membrane theory, cylindrical shells and the theory of shells having the form of a surface of revolution.
PREREQUISITE: CIVL 3700.03 or equivalent

CIVL 6165.03: Structures and the Urban Environment: The New Art of Structural Engineering.

This class seeks to introduce students to the new art of structural engineering through the studies of exemplary structures. It focuses on a series of designers, each of whom has created structures exhibiting personal style. These designers have seen their work as art in the same sense that leading architects have seen their work. A variety of structural forms will be studied. Study will be made up of a small set of historically significant designs, judged to be in the front rank both technically and artistically.

CIVL 6166.03: Advanced Structural Engineering Concepts.

The class will address selected advanced topics in structural engineering related to the characteristics of loading and the behavior and design of structural systems. Ultimate strength, stability, connections and post-buckling strength will be examined, focusing on elements employed in building and bridge structures.
FORMAT: Lecture

CIVL 6167.03: Microbes in Industrial Failures.

The deterioration of materials by microorganisms is of great economic significance. It has been estimated that the biological deterioration of all industrial materials, is in the billions of dollars annually. This course is going to cover the microbial damage to building, oil and gas, wood, transportation, steel and mining industries.
FORMAT: Lectures, labs and field trips

CIVL 6201.03: Road Safety Science.

The class is intended to provide an introduction to the science of road safety with particular emphasis on its application to current newly developing highway design and traffic engineering practices. The class will be divided into five major sections: introductory principles; human factors; road safety analysis, diagnosis and prescription; road safety considerations in facility design and operations; special consideration; network-level analysis.

CIVL 6202.03: Emerging Road Transportation Technologies.

This class is intended to provide students with an overview of emerging road transportation technologies and their implications for road transportation engineering practice in the following settings: Road transport planning; road design; operations and management; maintenance and rehabilitation; performance monitoring and assessment. The technologies examined will include developments in analytical and computational methods, decision support tools, and hardware.

CIVL 6414.03: Environmental Systems Engineering.

This course discusses various operational research techniques and their applications to environmental systems planning and pollution control. Case studies are designed to deal with the planning, design, and operation issues of environmental systems. Uncertainty-based optimization will be discussed for addressing systems' variability and for making decisions with improved cost-effectiveness and efficiency. Computer software packages will be used to enhance the course learning.
FORMAT: Lecture/computer lab
PREREQUISITE: Statistics and Engineering Mathematics or consent by the instructor.

CIVL 6546.03: Maintenance Planning and Management of Civil Infrastructure Systems.

Introduction to and overview of infrastructure deterioration in North America, focusing on transportation infrastructure and underground facilities. Topics on condition assessment, performance prediction, and maintenance optimization. Discussions on life cycle costing of preventive maintenance, rehabilitation, and replacement. State of the art in infrastructure inspection and data collection/acquisition technologies. Development of infrastructure management systems and the use of information technology as decision support tools.

CIVL 6860.03: Introduction to Geographic Information Systems (GIS).

This class is an introduction to the fundamentals of the Geographic Information Systems (GIS) and its general applications. The topics covered include: 1) the concept and components of a GIS, its general application, hardware and software, etc.; 2) Geographic Data (vector, raster and attribute data): structure, inputs, acquisitions, and conversion, and operations; 3) Digital Elevation Models (DEM) and its applications. The class emphasizes the engineering applications.

CIVL 6861.03: Advanced Geographic Information Systems (GIS).

This class deals with the advanced techniques of GIS in civil engineering application, covering the following topics for civil and environmental engineering planning and construction: 1) Selections of optimal site, routine, and area with multi-criteria; 2) Determinations of the closest facility from any location, the shortest path between different points, the service areas around any location; 3) Techniques of Terrain Analysis, Spatial Analysis, and Spatial Modeling.

CIVL 7000.03: Directed Studies in Civil Engineering II.

This class is designed for a Doctoral Candidate pursuing graduate studies leading to a PhD degree in Civil Engineering. It offers the graduate student an opportunity to complete an advanced study in a specific topic of interest that is not included in the regular classes offered. The student works under the supervision of a faculty member in the Civil Engineering Department.

CIVL 7101.03: Advanced Theoretical Soil Mechanics.

Advanced analysis of strength and deformation of soils in two and three dimensions. Applications to problems of earth pressure, the stability of slopes and earth dams, the stability and movement of foundations, interaction between structures and foundations, bearing capacity and deformation of pavement, mechanics of soil-vehicle systems.
PREREQUISITE: CIVL 6102.03, CIVL 6126.03 or CIVL 6127.03

CIVL 7105.03: Graduate Seminar - PhD Level.

This seminar class is designed to provide graduate students with the opportunity to search the literature for information on current topics related to their project/thesis. All graduate students pursuing a PhD degree in the Civil Engineering Program are required to take this class and offer their findings, orally, in TWO presentations to the faculty members of the department and students, in two intervals, before their thesis defense. The presentation will be followed by a question and answer session. Graduate students might also be asked to submit a written version of their presentations (or a hard-copy of their presentation slides) to the Graduate Coordinator of their department. This seminar class will be offered twice each academic year in the format of an end-of-term-conference in Fall and Winter semesters, respectively. Evaluation will be based on preparation, presentation skills, scientific content, ability to field questions and regular attendance. Graded pass/fail
NOTE: (1)This is a required class for all PhD students in the Department of Civil and Resource Engineering; (2)Registration of this class is required only for the term during which students present their research findings.

CIVL 9000.00: Masters Thesis/Project.

CIVL 9530.00: PhD Thesis.

Mineral Resource Engineering Program

I. Introduction

Canada has an abundance of natural resources and is a world leader in mineral and hydrocarbon extraction and processing. Mineral Resource Engineering concentrates on the technical, environmental and economic aspects of the extraction and processing of the earth's mineral resources. It has a strong industrial and research interest in many aspects of this sector. Graduate Studies in Mineral Resource Engineering has specializations in mining, petroleum, and mineral processing.

A. Specialization in mining and mineral processing engineering

If a student chooses to specialize in mining engineering, opportunities exist for advanced studies in underground and surface mining of coal, oil shales, metals, gold and industrial minerals. Research topics may include rock mechanics, mine design, ground support, field monitoring, optimization, equipment maintenance and many more. A student may also choose to specialize in mineral processing with the focus on the beneficiation of ores.

B. Specialization in petroleum engineering

Research opportunities exist in reservoir engineering, offshore drilling, production of oil and gas, petroleum geomechanics, wellbore stability, and more. Graduate studies in petroleum engineering prepares students for a career in the conventional petroleum sector as well as the oil sands mining.

In addition to the Graduate Scholarships available in the Faculty of Engineering and Dalhousie University, the Mineral Resource Engineering Program also provides a limited number of Research Assistantships to highly qualified candidates. Candidates are suggested to contact individual faculty members for details.

II. Class Descriptions

(Not all classes are offered every year. Please consult the current timetable for this year's offerings)

See the Engineering section of this calendar for Master's and Doctoral program details. Courses listed under PETR-petroleum engineering may also be accepted for credit toward graduate studies in Mineral Resource Engineering.

MINE 6001.03: Advanced Rock Mechanics.

This class deals with specific rock mechanics problems related to ground stability control in mines. Emphasis is placed on in situ stress measurement, stress change and ground movement monitoring, numerical modelling in mining applications, rockbursting and microseismic monitoring. Theory, state-of-the-art and existing problems of relevant techniques are discussed. Case studies are included to solve practical problems.
PREREQUISITE: Knowledge of differential equations and linear algebra and MINE 3611.03 or equivalent.

MINE 6002.03: Mine Excavation.

Advanced technology of excavation with particular emphasis on tunnelling. Analysis of continuous and cyclical excavation methods. Advanced ground support technology. Excavation equipment. Economic analysis. Studies of case histories of excavation projects.

MINE 6004.03: Analysis of Mineral Industries.

Evaluation of mining properties and mineral processing industries. Supply of, and demand for, mineral raw materials, world distribution and trade in minerals, mineral in national/international affairs. Canadian mineral policy, conservation of mineral resources, substitutes, secondary recovery of mineral raw materials, business cycles in the mineral industries, financing of new mining projects and source of funds.

MINE 6007.03: Directed Studies in Mining Engineering.

This class is available to graduate students enrolled in a Masters Program in Mineral Resource Engineering wishing to gain knowledge in a specific area for which no graduate level class is offered. Students are assigned an advisor and are required to present a formal report at the end of the class.

MINE 6008.03: Advanced Petroleum Engineering.

The class is an advanced study of petroleum reservoir engineering, drilling and development. The emphasis is on topics such as: analysis and prediction of oil and gas reservoir performance under a variety of production methods, theory and practice of well testing and pressure

analysis techniques, well planning, drilling optimization, enhanced recovery mechanisms, displacement theory and modelling. The class content will be adapted to the interest of the student as far as possible.
CROSS-LISTING: MINE 4822.03

MINE 6009.03: Offshore Drilling and Production.

This class is oriented toward the practical applications of offshore drilling, production and completion technology in the ocean environment. Emphasis is placed on the types, applications and limitations of offshore rigs, platforms and subsea production systems. The technical aspects of offshore islands, breakwaters, safety and fire protection, loading and transportation systems are also covered. The decision making process based on economics and developing technology regarding offshore field development and production is presented as a case study.
CROSS-LISTING: MINE 4823.03

MINE 6010.03: Solid-Liquid Separation.

The class outlines the fundamental principles of solid-liquid separation processes. Based on this theory, scaling-up procedures for the various separators, from laboratory test results are given. Means of improving solid-liquid separation by using coagulants, flocculants or dewatering aids are discussed. Processes considered include: gravitational and centrifugal thickening, flotation, vacuum, pressure and centrifugal filtration and dewatering by screens and electrophoretic methods. Test results obtained in laboratory work will be used in sizing of equipment.

MINE 6011.03: Advanced Mine Planning and Design.

This class deals with the application of advanced design principles to the planning, design and optimization of surface and underground mining systems. These principles include the Lerch-Grossman's algorithm, CAD and simulation modelling techniques. Under given geological and geomechanic factors, these techniques will be used for designing and optimizing underground mining methods or open pit layouts for massive, thin, pitching and multi-seam mineral deposits.

MINE 6012.03: Advanced Economic Evaluation of Mineral Resources.

This class deals with the application of advanced statistical and probability theory in mineral resource investment risk and uncertainty analyses in random variable states. Numerical modelling of stochastic processes governing complex mineral resource projects will be carried out using derivative mine valuation concepts. Using available simulation and numerical modelling software packages, students will undertake projects on class studies in mineral resources, coal, oil and gas properties.

MINE 6015.03: Advanced Mining Engineering Analysis.

This class covers several topics in mining engineering analysis including mine drainage, shaft sinking techniques under difficult conditions and mine backfilling. Emphasis is placed on quantitative methods and software tools available to assist with analysis and design in these areas. Relevant case studies are presented to highlight the topics in the class. Students will also have to complete a computer or laboratory based project.
PREREQUISITE: Permission of instructor

MINE 6016.03: Geomechanical Measurements.

This class deals with measurements typical for geomechanical research in the fields of mining, petroleum and geotechnical engineering. Emphasis is placed on techniques and instrumentation for the measurement of load, deformation, permeability, and acoustic emissions/properties in rock and concrete materials. Topics cover issues related to data acquisition and analysis such as instrument drift/calibration, digital sampling theory, intrinsic safety, and scaling principles. Students will undertake a major laboratory project.
FORMAT: Lecture/Lab 3 hours
PREREQUISITE: Permission of Instructor

MINE 6017.03: Mining and the Environment.

This class covers environmental practices, problems and solutions in the mining industry. Topics include regulations, reclamation, mine closure, acid rock drainage, surface subsidence, nuclear waste disposal and coal mine explosions. Case studies are used to highlight these topics. Class participation is emphasized through oral and written presentations.
FORMAT: 3 hours lecture, 2 hours lab weekly
PREREQUISITE: MINE 3500.03
CROSS-LISTING: MINE 4815.03

MINE 6021.03: Pit Slope Stability.

This class deals with slope stability and the associated problems in surface mining. Fundamentals of various analysis techniques for slope stability are reviewed. Risk and uncertainty analysis is introduced. Application of these techniques to optimization of slope design is discussed. Major topics include: geological structure controlled and strength controlled slope failure, slope failure in soft ground, risk and uncertainty analysis, and optimization of slope design.
PREREQUISITE: MINE 3510.03, MINE 3611.03 or permission of instructor

MINE 6900.03: Graduate Seminar - Master's Level.

This seminar class is designed to provide graduate students with the opportunity to search the literature for information on current topics related to their projects/thesis. All graduate students pursuing MEng and MASc degrees in the Mineral Resource Engineering program are required to take this class and offer their findings, orally in ONE presentation to the faculty members of the department and students, four months prior to the completion of their program. This presentation will be followed by a question and answer session. Graduate students might also be asked to submit a written version of their presentations (or a hard-copy of their presentation slides) to the Graduate Coordinator of their department. This seminar class will be offered twice each academic year in the format of an end-of-term-conference in Fall and Winter semesters, respectively. Evaluation will be based on preparation, presentation skills, scientific content, ability to field questions and regular attendance. Graded pass/fail.
NOTE: (1) This is a required class for all Master students in the Department of Civil and Resource Engineering: (2) Registration of this class is required only for the term during which students present their research findings.

MINE 7007.03: Directed Studies in Mineral Resource Engineering.

This class is available to Graduate Students enrolled in a PhD Program in Mining Engineering wishing to gain knowledge in a specific area for which no graduate level class is offered. Students are assigned an advisor and are required to present a formal report at the end of the class.

MINE 7900.03: Graduate Seminar - PhD Level.

This seminar class is designed to provide graduate students with the opportunity to search the literature for information on current topics related to their project/thesis. All graduate students pursuing a PhD degree in the Mineral Resource Engineering Program are required to take this class and offer their findings, orally, in TWO presentations to the faculty members of the department and students, in two intervals, before their thesis defense. The presentation will be followed by a question and answer session. Graduate students might also be asked to submit a written version of their presentations (or a hard-copy of their presentation slides) to the Graduate Coordinator of their department. This seminar class will be offered twice each academic year in the format of an end-of-term-conference in Fall and Winter semesters, respectively. Evaluation will be based on preparation, presentation skills, scientific content, ability to field questions and regular attendance. Graded pass/fail.
NOTE: (1) This is a required class for all PhD students in the Department of Civil and Resource Engineering; (2) Registration of this class is required only for the term during which students present their research findings.

MINE 9000.00: Master’s Thesis/Project.

MINE 9530.00: PhD Thesis.

Classics

Location: 6135 University Avenue
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Chairperson of Department

Hankey, W.J.

Professors Emeriti

Crouse, R.D., BA (Vind), STB (Harvard), MTh (Trinity), PhD (Harvard)
Fredrich, R., Dr Phil (Goettingen)
Starnes, C.J., BA (Bishop's), STB (Harvard), MA (McGill), PhD (Dal)

Professor

Hankey, W.J., BA (Vind), MA (Toronto), PhD (Oxon)

Associate Professor

House, D.K., MA (Dal), PhD (Liverpool)

Assistant Professors

Cohen, S.T., BA (Yale), BA (Cambridge), MA, PhD (Chicago)
Fournier, M., BA, MA (Dal), PhD (Boston College)
MacLeod, L., BA (Brock), MA, PhD (Dal)
McGonagill, G., BA (Vind), MA (Dal), PhD (Harvard)
O'Brien, P., BA (Vind), MA (Dal), MA, PhD (BU) Graduate Coordinator

Adjunct Professors

Calkin, P., BA (UBC), MA, PhD (Dal)
Crouse, R.D., BA (Vind), STB (Harv), MTh (Trin), PhD (Harv), DD (Trin)
Curran, T.H., BA (Toronto), MA (Dal), MTh (AST), PhD (Durham)
Fraser, K.A., BA (Vind), MA (Dal), MPhil, PhD (Cambridge)
Friedrich, R., PhD (Goettingen)
Johnston, A.M., BA (Mount A), MA, PhD (Dal)
Robertson, N., BA (Vind), MA (Dal), PhD (Cambridge)
Stewart, I.G., BSc (Trent), MA (Toronto), PhD (Cambridge)

The Department welcomes students who wish to pursue graduate work in classical studies. In addition to students interested in the historical, literary, and philosophical culture of antiquity, the program might appeal to students who wish to study the relation of contemporary culture to its classical origins.

MA students may concentrate their work in Greek or Roman history, literature, or philosophy. PhD candidates must work in the area of Hellenic and Hellenistic Studies.

I. Admission Requirements

Candidates must satisfy the admission requirements of the Faculty of Graduate Studies and will normally hold an Honours degree in Classics or its equivalent. The requirement of both Classical languages at Honours level may sometimes be relaxed, e.g., where a student has taken a Combined Honours class involving only one Classical language. In such cases at least two classes in the second language will be taken in addition to the MA class proper. In certain programs, a knowledge of other ancient or modern languages may be required.

Before submitting their applications, candidates should contact the Department of Classics for information on departmental application requirements not specified on the FGS forms. Candidates who are Canadian citizens or permanent residents and who wish to be considered for departmentally administered scholarship funding must have applied for the relevant scholarships or fellowships offered by SSHRC (further information available at www.sshrc.ca). The deadlines for SSHRC applications fall in the autumn of the year preceding the year in which studies begin. All candidates wishing to be considered for departmentally administered scholarships should note the application deadlines set by the Department, which fall well in advance of the admission deadline of June 1: Killam Scholarships and FGS Scholarships, January 25th.

A. Master of Arts (MA)

Three graduate seminars, two in the general area of interest and a reading and research class related to the thesis subject are required. Candidates are expected to attend graduate seminars related to their theses throughout their period of full-time study. A thesis is required.

MA students should obtain a copy of the Departmental regulations for the degree.

B. Doctor of Philosophy (PhD)

The normal admission requirement is the Dalhousie MA in Classics, or equivalent preparation. The minimum residence requirement for such candidates is two years, during which time they must satisfy the general requirements of the Faculty, and, in addition, must demonstrate competence in the languages (ancient and modern) necessary for research in their particular fields of study.

All candidates are expected to have a broad understanding of all aspects of Classical culture. Within the general area of Hellenic-Hellenistic Studies, each candidate is expected to concentrate, with the guidance of a Supervising Committee, in one of three fields: History, Literature or Philosophy. Before submitting a thesis, the candidate must pass a comprehensive examination (written and oral) in his or her special field: this will normally be taken towards the end of the second or beginning of the third year of study.

II. Classes Offered

Not all courses are offered every year. Content of courses may change from year to year. Please consult departmental website for offerings and full descriptions.

Greek and Latin Literature

CLAS 5010.06: Greek Epic.
A study of Greek epic in the original language.

CLAS 5011.06: Greek Drama: Tragedy.
A study of the Greek tragic poets, Aeschylus, Sophocles, Euripides in the original language.

CLAS 5012.06: Greek Comedy.

CLAS 5013.06: Greek Lyric.
A study of lyric poets such as Sappho, Archilochus, Simondides in the original language.

CLAS 5020.06: Greek Literature.

CLAS 5021.03: Reading and Research in Greek Literature I.

CLAS 5022.03: Reading and Research in Greek Literature II.

CLAS 5030.06: Latin Literature.

CLAS 5031.06: Roman Satire.

CLAS 5032.06: Roman Historians.

CLAS 5033.06: Advanced Seminar on Latin Literature.

CLAS 5034.06: Greek Literature.

CLAS 5040.06: A Study of Vergil.

A study of the development and importance of Vergil's basic themes and ideas embodied in the Aeneid. In the first part of the class special attention is given to his early work the Bucolics, where his themes begin to appear, and their development is then followed through the relevant parts of the Georgics. The main part of the class is devoted to the reading and discussion of the chief themes of the Aeneid, especially as they illustrate Roman political, religious and social ideas which have greatly influenced our own beliefs and institutions.

CLAS 5041.03: Reading and Research in Latin Literature I.

CLAS 5042.03: Reading and Research in Latin Literature II.

A study of the cultural and political history of Rome during the principle of Augustus;we will focus on the reformation of Roman elite culture during this period in light of the intellectual tradition of the late republic and the cultural politics of the age of Nero.
INSTRUCTOR(S): S. Cohen
FORMAT: Seminar
Co-REQUISITES: CLAS 4545.03

CLAS 5070.03: A study of the Latin Text of Augustine's "Confessions" .

This class approaches the thought of St. Augustine through a study of various literary, philosophical and spiritual aspects of the Latin text of his "Confessions".

Ancient History

CLAS 5530X/Y.06: Ancient Religion: Classical Antiquity to the Rise of Christianity.

Selected topics from the transition from Classical to Christian culture are studied. Particular attention is paid to the connection between religious innovation and the effect of the new beliefs on literature, art and philosophy.

CLAS 5531.03: Roman Empire and the Rise of Christianity.

CLAS 5535X/Y.06: Rome and the East.

This class will consider relations between Rome and her eastern neighbors -- the Parthians and the Sasanians -- from 53 B.C. To A.D. 628. It will examine the development of Roman policy in the region from the establishment of imperial control in the Near East to the costly wars of the early Byzantine period. Consideration will also be given to the Parthian and Persian kingdoms and to the frontier region.

CLAS 5540.03: Ammianus Marcellinus and his World.

This class approaches the history and culture of the fourth century AD through its most important historian, Ammianus Marcellinus. The class will focus on (but not be limited to) a careful study of Books 14-25 of the Res Gestae, which span the reign of Ammianus' hero, Julian the Apostate.
FORMAT: Seminar
PREREQUISITE: Three years of undergraduate Latin or the permission of the instructor.

CLAS 5545.03: Roman Culture and Roman Politics in the Transition to Autocracy.

A study of the cultural and political history of Rome during the principate of Augustus; we will focus on the reformation of roman elite culture during this period in light of the intellectual traditions of the late republic and the cultural politics of the age of Nero.

CLAS 5550.06: Reading and Research in Ancient History II.

CLAS 5552.03: Reading and Research in Ancient History I.

Classical Philosophy

CLAS 5600.06: Philosophy of Aristotle.

CLAS 5601.06: Plato and Neoplatonism.

CLAS 5602.06: Aristotle.

This seminar involves the detailed study of either Aristotle's Metaphysics or De Anima or Physics or ethical and political treatises. The choice of texts varies from year to year.

CLAS 5603.06: Philosophy of Plato.

This seminar involves the detailed study of a group of dialogues. The choice of dialogues varies from year to year.

CLAS 5604.06: Philosophy of Aristotle.

The general scope of the Aristotelian Philosophy - the understanding of nature, the City, the aesthetic experience of humanity - is considered in relation to the argument of the Metaphysics or `First Philosophy'.

CLAS 5605.06: Neoplatonism: Plato and Neoplatonism.

The philosophy of Plotinus and later thinkers considered as the resume of Greek Philosophy; in particular the role of Plato and other older philosophers in the formation of Neoplatonism is a principal interest.

CLAS 5606.06: Greek Philosophical Texts.

CLAS 5607.06: Latin Philosophical Texts.

CLAS 5608.06: Reading and Research.

CLAS 5609.03: Greek Philosophical Texts.

CLAS 5610.03: Latin Philosophical Texts.

CLAS 5840.06: Latin philosophical Texts.

The purpose is to give students experience in reading philosophical Latin. The texts are normally chosen from medieval authors like Anselm, Aquinas, and Bonaventure.

Patristics

CLAS 5060.03: Boethius and Prosimetrum: Poetry and Prose in the Consolation of Philosophy.

Boethius' Consolation is a strange example of Menippean satire, which is itself a strange genre. This class will consider the poetry, the prose and, most significantly, how these elements are combined in order to achieve the goal of the work, which is to offer consolation to the reader.

CLAS 5370.06: The Augustinian Tradition.

The class considers the effect of Augustine on the philosophical and theological thought of late Antiquity and the Middle Ages.

CLAS 5700.06: Philosophy of the Church Fathers.

This seminar involves the detailed study of a text, or group of texts, from one or more of the Greek or Latin Church Fathers. The choice of text varies from year to year, in relation to the needs and interests of students.

CLAS 5701.06: Medieval Interpreters of Aristotle.

The class considers Latin philosophical texts of the Middle Ages.

CLAS 5705.06: St. Augustine I.

A study of the three parts of Augustine's Confessions with a view to understanding his dissatisfaction with the various positions he adopted prior to his conversion to Christianity (Part 1), the practical consequences of this conversion (Part II), and the new theoretical understanding of time, space and motion which come out of his Trinitarian exegesis of the first chapters of Genesis (Part III). This class presupposes some knowledge of the history of Ancient Philosophy, and some of Latin.

CLAS 5706.06: St. Augustine's City of God.

A study of Augustine's account of the failure of the Roman Empire and of the new Christian 'city' that replaced it. The class sometimes concentrates on a definition of the new Christian state in second part (books XI to XXII) of the City of God and sometimes begins with a study of earlier accounts of Rome (Aeneid), and of the relations of Rome and the church in, for example, the Apostolic Fathers, the Acts of the Martyrs and Tertullian, before turning to the first ten books of the City of God.

CLAS 5707.06: St. Augustine's on the Trinity.

A study of the 15 books of Augustine's De Trinitate. The first term will concentrate on Books 1-7 in which he establishes what is the orthodox teaching about God through Scripture and a consideration of the categories of substance, relation and act. The second term examines Books 8-15 in which he attempts to understand what has been shown in the first 7 books through the distinction of scientia and sapientia. The class presupposes some knowledge of the history of ancient philosophy (especially Aristotle & Neo-Platonism) and some of Latin.

CLAS 5708.03: Reading and Research: Christian Beginnings and the Early History of the Church.

CLAS 5800.06: Christian Beginnings.

CLAS 5801.06: Christianity and Neoplatonism.

CLAS 5900.06: Departmental Seminar.

CLAS 5901.06: Reading and Research.

CLAS 9000.00: Master's Thesis.

CLAS 9530.00: Doctoral Thesis.

Clinical Vision Science

Location: IWK Health Centre
5850 University Avenue, 6th Floor
Halifax, NS B3V 3G9
Telephone: (902) 470-8959
Fax: (902) 470-7207

Director

McMain, K., BA. OC(C), COMT

Coordinator

Chauhan, B., BSc. MBCO, PhD (Wales)

Professors

Tremblay, F., BSc, PhD (Montreal), major appointment in the Department of Ophthalmology and Visual Sciences

Westwood, D.A., BSc, MA, PhD (Waterloo), major appointment in the School of Health and Human Performance.

Assistant Professors

Hahn, E., BPE, MSc, (Dal), OC(C), COMT
McMain, K., BA, OC(C), COMT
Parkinson, J., BA, CO, COMT
Walsh, L., BSc, OC(C), COMT

Lecturers

Harris, T., BSc, OC(C), COMT
Smith, S., MSc (Dal), OC(C), COMT

I. Introduction

Dalhousie University offers the program Master of Science Clinical Vision Science in cooperation with the IWK Health Centre and the IWK School of Orthoptics and Ophthalmic Medical Technology. This is a two-year degree program with thesis, requiring two years (six terms) full time fees, with a thesis continuation fee charged each term over the two years.

Orthoptists/ophthalmic medical technologists are professionals integral to eye care. They perform a wide range of diagnostic and highly technical procedures, and, in consultation with an opthalmologist, plan, implement and monitor treatment of a wide variety of ocular disorders, including disorders of binocular vision and ocular motility. They are engaged in a wide range of activities including research into ocular motility, education of other eye care professionals, patient education and vision screening.

The academic objective of the Clinical Vision Science program is to provide students interested in the profession of orthoptics/ophthalmic medical technology with a strong foundation in the vision sciences and in research techniques. The program is directed at optimising professional clinical practice by encouraging an integrated approach to the field of the vision sciences and expanding knowledge of the research that underpins much clinical practice. With its research component, the proposed program will ensure that graduates, as evidence-based practitioners, are prepared for both clinical and research-based practices and that they have the ability to analyze and relate research finding to clinical experience, skills vital for ensuring superior diagnostic and therapeutic services. The program will equip students with outstanding skills in the assessment, diagnosis and treatment of ocular disorders to ensure strong clinical competence and to enable them to be full participants in the interdisciplinary model of eye-care. The student will be exposed to a variety of clinical experiences that will prepare them for the independent nature of professional practice.

Students have the option of exiting from the program after the second program year with a Concurrent Graduate Diploma in Orthoptics and Ophthalmic Medical Technology, or complete a thesis for an MSc in Clinical Vision Science.

Dalhousie University is offering its Master's Program in Clinical Vision Science also in distance education. Distance learning students are receiving the same quality instruction as on-campus students, take the same exams and participate in direct ophthalmic care at supervised pre-approved clinical sites for the same period of time.

The distance delivery model is a flexible, Internet-based adaptation of the on-campus program, distance students can log into their course content through the Internet and learn, follow lectures and submit assignments from the comfort of their home or workplace.

The program is intended for those who are wishing to gain essential knowledge and expertise in the Orthoptist/ophthalmic medical technologist profession, and also for those who enter it at an advanced level for professional development.

There is no residential component in the CVS Distance Education Program.

II. Admission Requirements

Candidates must satisfy the general requirements for admission to the Faculty of Graduate Studies. Admission requirements for the MSc in clinical vision science will be the same as the requirement for Dalhousie University MSc: A four-year bachelor's degree from a recognized institution of higher education with a minimum of a B average (GPA 3.0).

Students whose native language is not English, must also, as required by the Faculty of Graduate Studies, demonstrate the ability to participate in a graduate program conducted in English prior to their acceptance to the program. The standard test of English competency is the TOEFL. The minimum acceptable score, as set by the Faculty of Graduate Studies and therefore required for acceptance to the MSc in clinical vision science, is 580 for the written test and 237 for the computer test.

In addition, entrants should have a minimum of one class in human anatomy and/or physiology and one class in psychology with a laboratory component. Exceptional students without these prerequisites may be admitted on the condition that they are fulfilled either prior to or concurrent with the program.

It is also recommended that students should have the following or equivalent undergraduate classes: research methods, e.g. statistics or research design; biochemistry, e.g. BIOC 3200.03 Biological Chemistry; perception and psychophysics, e.g. PSYO/NESC 3051.03 Sensory Neuroscience I. Vision; and one class in neuroanatomy or neurophysiology.
The application deadline is March 1st.

III. Class Descriptions

Year 1, Semester 1 (Fall)
VISC 5010.03
VISC 5020.03
VISC 5210.03
VISC 5220.06 (Fall and Winter)
VISC 5230.03

Year 1, Semester 2 (Winter)
VISC 5011.03
VISC 5211.03
VISC 5220.06 (Fall and Winter)
VISC 5240.03
VISC 5330.03

Year 1, Summer Session
VISC 5200.06, Clinical Practicum I

Year 2, Semester 1 (Fall)
VISC 5040.03
VISC 5310.03
VISC 5340.03
VISC 5350.03

Year 2, Semester 2 (Winter)
NURS 5120.03 or OCCU 5030.03
VISC 5300.06, Clinical Practicum II
VISC 9000.00, Thesis

Year 2, Summer Session
VISC 9000.00

Year 3, Semester 1 (Fall)
VISC 9000.00

Year 3, Semester 2 (Winter)
VISC 9000.00

Year 3, Summer Session
VISC 9000.00

Total credits = 7.5 academic credits plus 2 practica credits plus thesis (VISC 9000.00), **normally completed over three years.**

IV. Class Descriptions

VISC 5010.03: Fundamentals of Vision Science: Afferent System.
This class is designed to acquaint the student with the anatomy/physiology of the human central nervous system as it relates to the sensation of vision. Testing parameters used in the afferent visual system examination will be discussed. Recent developments in perimetry, clinical psychophysics, and electrophysiology will be explored.
INSTRUCTOR(S): McMain, K.
FORMAT: Lecture and lab
PREREQUISITE: This class is a prerequisite to Extraocular Motility disorders, Ocular Manifestations of Systemic Disease, and is normally taken prior to, or concurrent with, clinical Foundations of Ophthalmic Medical Technology

VISC 5011.03: Fundamentals of Vision Science: Efferent System.
This class is designed to provide the student with knowledge of eye movements and the neurological control of ocular motility. Through lecture, discussion, and assigned readings, the student will analyze and determine how abnormalities of ocular motility can be indicators of a disease process and its area of localization.
INSTRUCTOR(S): McMain, K.
FORMAT: Lecture

VISC 5020.03: Physical and Visual Optics.
This class will analyze physical, optical and ophthalmic principles, with an emphasis on the measurement of light and on its behavior in image formation. Visual optics in physical, animal and human modalities will be investigated critically in experiment and clinical venues.
INSTRUCTOR(S): Hahn, E.
FORMAT: Lecture and lab
PREREQUISITE: This class is a prerequisite for the Therapeutic and Psychosocial Aspects of Low Vision, Treatment of Visual Disorders, and Treatment of Ocular Motility disorders.

VISC 5040.03: Neuropharmacology for Vision Science: Basic Concepts and Therapeutics.
This class will consider the general principles of pharmacology before exploring the interaction pharmacology agents with the central nervous system and ocular structures. Medications used in the evaluation and treatment of ophthalmic disorders, along with medications used to treat systemic disorders that may produce ocular side effects, will be emphasized.
INSTRUCTOR(S): Hahn, E.
FORMAT: Lecture

VISC 5200.06: Practicum I.

This practicum period of 14 weeks following the first two semesters of study provides the student with the opportunity to participate in direct ophthalmic patient care. The student will consolidate the concepts, theories and skills previously learned while providing supervised vision care for clients in a clinic setting.
INSTRUCTOR(S): McMain, K.
FORMAT: Clinical Practicum
PREREQUISITE: VISC 6210.02, 5211.03 and 5230.03

VISC 5210.03: Clinical Foundations of Ophthalmic Medical Technology.

This class will introduce the student to the complexities of analysis of the visual system. This will be achieved through clinical scenarios in which the student will be required to engage in direct patient care, including sensory visual evaluation, physical ocular assessment, and biomedical application of ophthalmic instrumentation.
INSTRUCTOR(S): Smith, S.
FORMAT: Lecture and lab
PREREQUISITE: VISC 6210.02, 5211.03 and 5230.03

VISC 5211.03: Clinical Foundations of Orthoptics.

This class will introduce the student to the wonders of binocular vision in its normal presentation and also the intricacies of its abnormalities. Integral to the class material will be the analysis of responses of the binocular system to various clinical challenges.
INSTRUCTOR(S): Smith, S.
FORMAT: Lecture and lab
PREREQUISITE: This class is a prerequisite for Practicum I

VISC 5220.06: Introduction to Orthoptic / Ophthalmic Medical Technology Professional Practice.

This class considers the role of the orthoptist / ophthalmic medical technologist both within the Eye Care Team and within the health care professions as a whole. Emphasis will be placed on the ability to critique, deliver and implement consultation, education, leadership and administration in the context of ophthalmic health care.
INSTRUCTOR(S): McMain, K.
FORMAT: Lecture

VISC 5230.03: Extraocular Motility Disorders.

Extraocular motility disorders and their treatment form the foundation for the understanding of ocular misalignment. In this class, anomalies of eye movement will be analyzed and the etiology will be reviewed. Emphasis, though, will be placed on the clinical presentation, formulation of diagnosis, and patient prognosis of anomalous Extraocular motility.
INSTRUCTOR(S): Walsh, L.
FORMAT: Lecture and lab
PREREQUISITE: VISC 5010.03 or permission of instructor. VISC 5010.03 should

VISC 5240.03: Therapeutic and Psychosocial Aspects of Low Vision.

This class encompasses a broad spectrum of visual impairments. The pathphysiological basis, clinical manifestations, and treatment modalities of visual loss will be addressed.
INSTRUCTOR(S): Parkinson, J.
FORMAT: Lecture and lab
PREREQUISITE: VISC 5020.03 or permission of instructor

VISC 5300.06: Practicum II.

This intensive practicum period of 22 weeks follows the completion of all class work. During this practicum students will have the opportunity to fully synthesize their academic and clinic knowledge. Upon completion students will be prepared to sit the orthoptic and ophthalmic medical technologist certification exams.
PREREQUISITE: VISC 5200.06 and 5330.03

VISC 5310.03: Ocular Manifestations of Systemic Disease.

The eye is a window through which manifestations of neurological, vascular infectious, inflammatory, and general systemic disease can be evaluated. This class will explore the signs and symptoms of ocular dysfunction as precursors, indicators and consequences of systemic disease that must be evaluated for optimal health care.
INSTRUCTOR(S): Parkinson, J.
FORMAT: Lecture
PREREQUISITE: VISC 5011.03 or permission of instructor.

VISC 5330.03: Treatment of Ocular Motility Disorders.

This class will examine and discuss the management of ocular motility anomalies. An overview of historical and current treatment modalities both surgical and non-surgical will be discussed. Emphasis will be given to the determination and application of appropriate management plans in case scenarios.
INSTRUCTOR(S): Walsh, L.
FORMAT: Lecture and lab
PREREQUISITE: This class is a prerequisite for Practicum II

VISC 5340.03: Treatment of Visual Disorders.

This class introduces a variety of therapeutic approaches to visual disorders with an in depth examination of historical and current methods of treating amblyopia and other developmental anomalies of the visual system. The treatment of acquired anomalies as well as routine spectacle and surgical treatment of refractive disorder will be covered.
INSTRUCTOR(S): Fraser, T.
FORMAT: Lecture and lab
PREREQUISITE: VISC 5240.03

VISC 5350.03: Topics of Vision Care.

This class will provide students with an opportunity to explore in depth topics of current interest in the ophthalmic field. The students will then have a sound knowledge base of potential areas of research and detailed knowledge of the field in which his/her thesis work will likely be undertaken.
INSTRUCTOR(S): Hahn, E.
FORMAT: Seminar format
PREREQUISITE: VISC 5210.03 and 5220.06.

VISC 9000.00: MSc Thesis.

Community Health and Epidemiology

Location: Centre for Clinical Research
2nd and 4th Floors
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Email: che@dal.ca
Website: http://che.medicine.dal.ca

Department Head

Kisely, S.R.

Director of Graduate Programs

Asbridge, M.M.

Professors

Anderson, D., BA (Queens), MD (Dal) major appointment in Department of Medicine
Brown, M. BA (Hons), MA (Queens), AM, PhD (Chicago), post-retirement
Grunfeld, E., BSc (Ottawa), MSc (Guelph), MD (McMaster), major appointment in Department of Medicine
Johnston, B.L., MD (Dal), FRCPC, major appointment in Department of Medicine
Kisely, S.R., MD, MSc (Manchester), GradDipEd, FRCPC, FRANZCP, MRC Psych, FAFPHM, MFPHM, MRACMA, Professor and Head
Langille, D., BSc (Acadia), MD (Dal), MHSc (UBC)
MacLean, L.C., BA, BEd (StFX), MA, PhD (Dal), major appointment in Business Administration
Murray, T.J., OC, MD (Dal), FRCPC, MACP, post-retirement
Poulin, C., BSc (Dal), MD (Laval), MSc (McGill), FRCPC
Sketris, I., BScPhm (Toronto), MPA (Dal), PharmD (Minnesota), major appointment in College of Pharmacy
Stewart, S., BSc (Dal), PhD (McGill), major appointment in Department of Psychology
Townsend, E., PhD (Dal), MAdEd (St.FX), BSc, DipP&OT (Toronto), major appointment in School of Occupational Therapy
VanZanten, S., MD (Amsterdam), FRCPC, major appointment in Division of Gastroenterology

Associate Professors

Burge, F., BA, MD (Queen's), CCFP, MSc (McGill), major appointment in Department of Family Medicine
Cox, J., BA (High Distinction), MD (Hons) (Toronto), major appointment in Department of Medicine
Dodds, L., BS (Vermont), MS (Washington), PhD (Toronto), major appointment in Obstetrics & Gynecology and Pediatrics
Flowerdew, G., BSc, MSc (London), DSc (Harvard)
Guernsey, J., BSc (Hons) (Carleton), MSc, PhD (Iowa)
Johnston, G.M., BSc (McGill), MHSA (Alberta), PhD (Western), major appointment in Health Services Administration
Joseph, K.S., MD (Madras), PhD (McGill), major appointment in Obstetrics & Gynecology and Pediatrics
Kephart, G., BS (Hons) (California), MS, PhD (Wisconsin)
Kirkland, S., BSc (Joint Hons), MSc (Waterloo), PhD (Toronto)
Kozousek, V., MD (Laval), FRCSC, MPH (Johns Hopkins), major appointment in Ophthalmology
Langley, J., BA (Queen's), MD (Dal), MSc (McMaster), major appointment in Pediatrics
Tomblin-Murphy, G., BN, MN (Dal), major appointment in School of Nursing

Assistant Professors

Andreou, P., BSc (Toronto), MA, MSc, PhD (Western)
Asada, Y., BS, MS (Tsukuba), PhD (Wisconsin-Madison)
Asbridge, M., BA, MA, PhD (Toronto)
Dunbar, M., BSc, MD (Dal), PhD (Lund), major appointment in Department of Surgery
Gahagan, J.A., BA (Hons) (Carleton), MA (Windsor), PhD (Wayne State), major appointment in School of Health and Human Performance
LeBlanc, J. MD, MSc (McMaster) FRCPC, major appointment in Pediatrics
MacKinnon, N.J., BSc (Dal), MSc (Wisconsin), PhD (Florida), major appointment in College of Pharmacy
MacPherson, K.M., BSc, MD (Dal), MPH (Michigan)
Mitnitski, A., PhD (Baltic State Technological Univ), major appointment in Department of Medicine
Porter, G., BA, MD (Queen's), MSc (Alberta), FRCSC, major appointment in Department of Surgery
Travers, A., BSc (Hons), MD (Dal), MSc (Alberta), FRCPC (EM), major appointment in Department of Emergency Medicine
Weerasinghe, S., BSc (Hons) (Jaffna), MSc (Colombo), PhD (Dal)

Lecturer

Campbell, L.A., BSc (Toronto), MSc (Dal), major appointment Capital Health

I. Introduction

A. Master of Science

The MSc Community Health and Epidemiology (CH&E) program emphasizes knowledge, analytical skills and formal evaluative methods with application to disease prevention, health promotion and assessment of community health service and system needs. The program includes 8 courses and thesis with a typical completion time of approximately two years for full-time students, four years for part-time students.

B. Institutional Environment

The Department of Community Health and Epidemiology is part of Dalhousie's Faculty of Medicine, which has primary responsibility for training new physicians in the Maritime Provinces, and is closely affiliated with the major teaching hospitals located in the Maritime Provinces. There are 11 core faculty (including one Canada Research Chair) in the department along with over 40 cross appointed faculty, drawn from departments of clinical medicine, health professions, engineering and basic and social sciences. Faculty in the Department of Community Health and Epidemiology have backgrounds in a number of disciplines including community medicine, epidemiology, biostatistics, occupational/ environmental health, population health, community psychology, and sociology. Faculty in the department have provided leadership in the areas of population health research, prevention, health promotion, policy development and assessment of community health service and system needs and have substantial national funding from CIHR, CPHI, CHSRF, SSHRC and NSHRF. The Department of Community Health and Epidemiology houses the CIHR funded RURAL Centre, the Canadian Longitudinal Survey on Aging, the Biostatistics Consulting Unit, the Population Health Research Unit (PHRU) and many other research projects.

II. Admission Requirements/Deadlines

The typical MSc CH&E student has had undergraduate training in a health profession or a related scientific discipline, and often has worked in the health sector. Admission standards are those of Dalhousie University's Faculty of Graduate Studies. An honours baccalaureate degree from a recognised university is usually required. Enrollment is limited. A limited number of part-time students are accepted. Applicants must meet Faculty of Graduate Studies English Language Competency. Applicants will be interviewed as part of the selection process.
Application deadline is March 1 for Canadian applicants and Jan 31 for non-Canadian applicants.

III. Curriculum

The program requires a minimum of five Core Classes, three Elective Classes and a Thesis. The five required classes are: Community Health Principles; Epidemiology Principles; Research Methods in Community Health & Epidemiology; Principles of Biostatistics; and Community Health Services Systems.

The Master's Thesis is a major part of the MSc CH&E program. A thesis may include the design and execution of an applied research project in the field of community health and epidemiology. Full-time students will ordinarily complete their thesis during their second year in the MSc program.

IV. Class Descriptions

CH&E 5000.03: Community Health Principles.

This is an introductory class in Community Health Principles for graduate-level students in the health fields. Community health focuses on the health of populations or groups. The class will cover a broad range of community health issues, and will focus on strategies to improve the health of a population with emphasis on health protection, disease prevention, and health promotion. The student will apply community health principles and acquire in-depth knowledge of specific health topic areas through group and individual projects.
INSTRUCTOR(S): D. Langille/K. MacPherson

CH&E 5010.03: Epidemiology Principles.

This introductory class is intended for graduate-level students with no background or formal training in epidemiology. This class introduces students to the basic principles and methods of epidemiology, with various examples from the literature in communicable and non-communicable diseases. Topics include measures of health and risk, epidemiological study designs and considerations regarding issues of measurement and precision that include assessments of internal and external validity, standardization, confounding, bias, interaction, causality, and generalisibility. The class is interspersed with presentations in selected special topics in epidemiology.
INSTRUCTOR(S): M. Asbridge / K. MacPherson

CH&E 5019.03: Principles of Biostatistics.

An introduction to statistics for medical and public health research. The class will provide an understanding of the basic principles underlying research design, data analysis and interpretation of results. Students will become proficient in the use of SAS to generate meaningful statistical information including the comparison of means and proportions and investigation of relationships between variables using least squares regression.
INSTRUCTOR(S): G. Flowerdew

CH&E 5020.03: Biostatistical Modelling.

Primary objective of this course is to gain mastery over the most frequently used statistical modeling techniques used in the clinical and population health data analysis using statistical software package SAS. Students will learn multiple regression and multivariate statistical techniques for different types of outcome measures such as continuous, dichotomous, polytomous and ordinal through modeling for associations with exposure(s) and confounders.
INSTRUCTOR(S): S. Weerasinghe

CH&E 5030.03: Research Methods in Community Health and Epidemiology.

This class explores the logic and principles of research design, measurement, and data collection. It focuses on the critical evaluation of research articles, research design, research proposal writing. The class covers a range of methodological issues and methods, including experimental and quasi-experimental designs, survey research and sampling, measurement, and qualitative methods.
INSTRUCTOR(S): G. Kephart

CH&E 5040.03: Community Health Services Systems.

This class introduces students to basic concepts and tools in health services research important for critical evaluation of health services systems and policy. The course overviews the evolution and delivery, organization, and financing of the Canadian health services system, explores theoretical frameworks to evaluate health services systems, and examines strategies for knowledge translation. The topics covered include: health-related quality of life measures, quality of health care, needs for health care, economic evaluation of health services, resource allocation, equity in health care and health outcomes, primary care reform, and public vs. private health care financing.
INSTRUCTOR(S): Y. Asada

CH&E 6001.03: Environmental and Occupational Health.

This class will introduce students to many of the principles and concepts underlying environmental and occupational health, focusing on human health. It will review the nature of a variety of agents, including chemical, physical, biological, ergonomic and radiation hazards, how these agents are dispersed and transformed in the environment, the pathways of human exposure to these agents, and characterization of the health effects resulting from exposure. It will prevent methods for evaluating and controlling hazards, including occupational hygiene evaluation techniques, legislation policy initiatives and risk assessment models used in environmental settings. Special topics will include risk communication and health promotion in the workplace.
INSTRUCTOR(S): J. Guernsey
CROSS-LISTING: ENVI 5010.03

CH&E 6010.03: Community Health Practicum.

INSTRUCTOR(S): M. Asbridge

CH&E 6020.03: Advanced Epidemiology.

This advanced class focuses on the design, conduct, analysis, and interpretation of epidemiologic studies. Both experimental (community intervention trials) and non-experimental, or observational (cohort, case-control), studies may be covered. Topics for general discussion will include study designs, subject selection, measurement issues pertaining to ascertainment of exposure and outcome, design issues such as stratification and matching, methodological issues such as confounding, effect modification, misclassification, and sources of bias. Data analysis will emphasize the practical application of statistical concepts; measuring associations and effect size, multivariate modelling, logistic regression, poison regression, and survival analysis (time permitting), and the combining of individual study results using meta-analysis.
INSTRUCTOR(S): S. Kirkland

CH&E 6021.03: Advanced Biostatistics.

This advanced Biostatistics class covers special topics like ordinal categorical data analysis, repeated measure designs, longitudinal data analysis and survival data analysis. Special topics like statistical principals in experimental design, fixed and random effects models will also be discussed. The special emphasis is on the model building strategies, evaluation and interpretation of results. The class requires the knowledge in preliminary data analysis and regression analysis. Students should also be familiar with the programming in SAS.
INSTRUCTOR(S): S. Weerasinghe

CH&E 6024.03: Methods in Clinical Trials.

This class is developed for students in the graduate program of Community Health and Epidemiology who have a particular interest in randomized controlled trials (RCT's). The class builds on the health concepts and epidemiological and statistical methods as taught elsewhere in the program. Successful participation in this class requires Epidemiological Principals (CH&E 5010A), Research Methods in Community Health and Epidemiology (CH&E 5030B) and Biostatistics II (CH&E 5020B) as prerequisites. Participants will be introduced to the practical issues in designing a controlled clinical trial by developing a clinical trial protocol throughout the class. Each week, a special topic is covered (e.g., selection of outcome measures, controlling bias, calculating

sample sizes) which is relevant to the development of the participants' protocol. Protocols will be presented at the end of the class. Evaluation is based on the written protocol as well as assignments.
INSTRUCTOR(S): P. Andreou

CH&E 6030.03: An Introduction to the Fundamentals of Medical Research.

This class is intended for students with an interest in carrying out research that is directly relevant to medical practice. The initial sessions will introduce students to the philosophy of inference in medicine. The topics to be covered will include the meaning of p values and confidence intervals, confounding and adjustment, Frequentist versus Bayesian inference and issues related to generalizability. This will be followed by classes that focus on diagnostic, prognostic and etiognostic research. Each topic will be introduced at the basic level and progress to a second level re-examination of the issues. The class will be based partly on "The Modern Scientific Physician" series (CMAJ 2001;165:441-2 and related articles).
INSTRUCTOR(S): K.S. Joseph

CH&E 6042.03: Determinants of Health in Human Populations.

This class will focus on health from a population and societal perspective, with an emphasis on the determinants and distribution of health in human populations. Students will be introduced to basic demographic tools and concepts useful for studying the health of populations, including the determinants of mortality/morbidity decline and change, the medicalization of health, and the changing institutional structure of health care delivery. Separate treatment will be given to health in developed countries, highlighting differences in the distribution, determinants, and consequences of health in the two settings. Population-based approaches to health policy will be explored.
INSTRUCTOR(S): G. Kephart/ Y. Asada

CH&E 6045.03: Qualitative Methods in Health Research.

This advanced class in community research introduces students to social theory and qualitative methodologies and techniques. The articulation of appropriate methods to address theoretical, epistemological and practical issues is emphasized. Students will develop a theoretically sound rationale for their proposed research and gain experience in data collection, fieldwork, and analysis.
INSTRUCTOR(S): J. Graham
CROSS-LISTING: BIOT 6045.03

CH&E 6047.03: A Population Health Perspective on Addictions and Mental Health.

This is a graduate-level class for students and professionals interested in addictions. The field of addictions is by nature multi-disciplinary and touches on aspects of health, sociology, psychology, education, law, social work, criminology, pharmacology, toxicology, international policy, and other disciplines. Thus, this class covers a broad range of health, social and biological issues. However, the primary perspective is from community health so that the class focuses on population-based strategies addressing the prevention and treatment of addictions. This course discusses current topics about use, abuse and dependency pertaining to alcohol, tobacco, and other substances including licit and illicit drugs. The class also discusses the emerging issue of gambling addiction.
INSTRUCTOR(S): C. Poulin / M. Asbridge

CH&E 6049.03: Meta-analysis: How to Interpret and Conduct a Systematic Review or Meta-analysis of the Literature.

In the current era of Evidence Based Medicine Systematic Reviews or Meta-analysis are becoming increasingly important. This is especially true for the evaluation of efficacy of treatment but it is also gaining more importance in the evaluation of diagnostic tests, causation, natural history of disease and economic evaluations. In the class, the student will learn the ins and outs of systematic reviews and meta-analysis. Specific topics include guidelines on how to read and interpret published systematic reviews, framing of the research question for a systematic review, identification and selection of studies, development of in and exclusion criteria, importance of validation of the extracted information, combining results in either a qualitative or quantitative fashion, statistical techniques used to conduct a formal meta-analysis and interpretation of results.
INSTRUCTOR(S): S. van Zanten

CH&E 6060.03: Directed Readings/Studies I.

CH&E 6062.03: Directed Readings/Studies II.

CH&E 9000.00: Master's Thesis

Computational Biology and Bioinformatics

Location: Computer Science Bldg. Halifax, NS, B3H 5W1
Telephone: (902) 494-6702
Fax: (902) 494-1517
Website: http://vibrio.cs.dal.ca/bioinformatics/

Graduate Coordinator

Blouin, C., PhD (Dalhousie)
Being interdisciplinary in nature and structure, the program draws on a selection of faculty who teach and research in Computational Biology and Bioinformatics. The following is a list of faculty who actively contribute to the program. To identify potential supervisors, you are encouraged to contact any Dalhousie faculty with interest in this area. The graduate coordinator can be of assistance to find faculty with specific research interests.

Faculty

Bielawski, J.P. (Biology, Mathematics and Statistics)
Blouin, C. (Computer Science, Biochemistry and Molecular Biology)
Doolittle, W.F. (Biochemistry and Molecular Biology)
Field, C. (Emeritus, Mathematics and Statistics)
Gu, H. (Mathematics and Statistics)
Herbinger, C.M. (Biology, Mathematics and Statistics)
Roger, A.J. (Biochemistry and Molecular Biology)
Susko, E. (Mathematics and Statistics)

I. Master of Science

The program is an interdisciplinary master's degree with an emphasis on thesis work which focuses on tackling problems in biology, molecular biology and health-related fields through significant research contributions in mathematics, statistics and computer science.

This program is set within the framework of current interdisciplinary research conducted within Dalhousie. Students in this program will join a community of researchers in the fields of computational biology and bioinformatics. Resources from the Faculty of Computer Science, Medicine and Science are coordinated to offer a flexible program, with a limited class load and an emphasis on research activities. Students from a broad selection of backgrounds are invited to consider the program. Each candidate is supervised within the research group of their supervisor from the beginning of their tenure.

The program is available on a full-time basis. The only pre-specified class requirement is the program seminar series; however, a selection of specialized classes is usually required by the Admission committee. The specifics of class selection are made on an individual basis in coordination with the candidate, the supervisor(s), and the admission committee.
An admissible research topic must include relevant work on a current biological problem through innovative methodology in Mathematics, Statistics or Computer Science.

A. Application and Admission

Candidates for admission to the masters of computational biology and bioinformatics should hold an honours degree, or equivalent, from a university of recognized standing in any relevant discipline. Relevant disciplines are typically: Biology, Biochemistry and Molecular Biology, Computer Science, Mathematics, Physics and Statistics. Students from any background will be considered on an individual basis. All candidates must meet the requirements of the Faculty of Graduate Studies.

Prior to applying, a candidate must find a suitable supervisor or co-supervisors. A statement of research interests must be submitted with the application forms that can be obtained from the Registrar's office. The statement may be prepared in conjunction with the supervisor(s) and should include a general statement of the biological areas of interest, possible computational methodologies relevant to the problem, and a statement on the candidate's background. This document is used to evaluate whether suitable academic activities will allow the candidate to meet the program requirements.

All material should be submitted by the strict deadline of April 1st for overseas applicants and June 1st for North-American applicants. Foreign students applying for scholarship consideration are strongly encouraged to submit a completed application before January 31st.

Candidates from outside Canada whose native language is not English must demonstrate their capacity to pursue a master's program in English. Results of a TOEFL or other Standard English competency test should be submitted at the time of application. The minimum TOEFL score required is 580 (computerized TOEFL score required is 237).

B. Program Requirements

Candidates for the Master's degree in Computational Biology and Bioinformatics are expected to complete four 0.5 credit classes and two credited seminar classes. The class selection must be made to further the candidate's existing strengths, and to provide the necessary background to successfully meet the thesis requirements.

The thesis must be reviewed by the supervisor(s) and up to two readers to meet the breadth requirement. These requirement states that: 1) at least one of the readers evaluate the biological aspect of the research project and hails from a biological background (including, but not limited to, Biology and Biochemistry). 2) at least one of the readers evaluate the contribution of the thesis in either Mathematics, Statistics or Computer Science.
The candidate also must demonstrate a general grasp of current bioinformatics issues and methodologies.

C. Administration

The Executive committee is comprised of at least one representative from the following academic units:
1. Biochemistry and Molecular Biology
2. Biology and Marine Biology
3. Computer Science
4. Mathematics and Statistics

The Executive committee also acts as Admission committee while administrative support will be provided by the Faculty of Computer Science. All communication with the program should be done directly to the Graduate Coordinator.

II. Classes offered

The class selection will be determined on an individual basis. Any acceptable graduate classes can be selected, as explained in section B. The following classes are specific to the program and are designed to bring students from different backgrounds to a common level. Contact the Graduate Coordinator for further details.

A. Computer Science

CSCI 6801.03: Computational Biology and Bioinformatics.

CSCI 6802.03: Algorithms in Bioinformatics.

B. Biochemistry and Molecular Biology

BIOC 5010.03: Bioinformatics.

C. Mathematics and Statistics

STAT 5620.03: Statistical Issues in Molecular Evolution.

Computer Science

Location: 6050 University Avenue
Halifax, NS B3H 1W5
Telephone: (902) 494-2093
Fax: (902) 492-1517
Email: grad@cs.dal.ca
Website: www.cs.dal.ca

Dean, Faculty of Computer Science

Shepherd, M.A., MSc, PhD (Western), Hypertext, Information Retrieval, Web Information Systems, Electronic News, Information Filtering, Health Informatics.

Associate Dean

McAllister, M., BMath (Waterloo), MSc (UBC), PhD (UBC), Algorithms, Network security and privacy, Computational geometry, Distributed systems.

Administrative Assistant to the Dean

Publicover, A., BSc (Dal), BA (Dal) Telephone: (902) 494-1199

Graduate Administrator

Teferra, M., Telephone (902) 494-6438
Email: menen@cs.dal.ca

Graduate Admissions/Interdisciplinary Administration

Bolivar, A. Telephone (902) 494-2740
Email: angie@cs.dal.ca

Professors

Abidi, S., BEng (NED, Eng and Tech), MSc (Miami), PhD (Surrey), Knowledge management, Artificial Intelligence, Medical Informatics, Knowledge discovery and data mining, Neural Networks, Enterprise Information Systems.

Bodorik, P., BSc (Calgary), MEng, PhD (Carleton), Databases & Distributed Databases, Architectural Support for Operating Systems.

Borwein, J., BA (Western Ontario) MSc, PhD (DPhil) (Oxford), Optimization, Computational mathematics, Internet and Collaborative Technology.

Cox, P.T., BSc, MSc (Auckland), PhD (Waterloo), Visual Programming and Design Languages; Computational Logic; Logic and Functional Programming.

Farrag, A., MSc (SFU), PhD (Alta), Fault-tolerance, Distributed Computing, Concurrency, Databases.

Gao, Q., MASc, PhD (Waterloo), Machine intelligence, computer vision, image processing, data mining, data warehousing.

Gentleman, W.M., BSc (Hons) McGill, MA (Mathematics) Princeton, PhD (Mathematics) Princeton, Software Engineering, Computer Architecture, Real-time Systems, Numerical analysis, Signal processing.

Grundke, E. W., BSc, MSc (Dalhousie), PhD (Waterloo), Wireless Networks, Simulation, Decision support software.

Hitchcock, P., MA (Oxford), PhD (Warwick), Software Engineering, Requirements, Databases.

Inkpen, K., BSc (Dalhousie), PhD (UBC), Computer-supported cooperative work, Human computer interaction, Ubiquitous computing.

Jost, A., BSc, MSc, PhD (Dalhousie), Telecommunications, Microelectronics, VLSI, Computer-aided Design, Computer Networks.

McHugh, J., BS Physics (Duke), MS Computer Science (Maryland), PhD (Texas), Computer security, Network security, Network data analysis, Software engineering, Software assurance.

Milios, E., Dipl Eng (NTUA), SM, EE, PhD(MIT), Networked information spaces, Machine learning, Image and shape databases.

Rau-Chaplin, A., BCompSc (York), MCompSc, PhD (Carleton), Parallel Computing, Computational Geometry, Computer aided Architectural Design, Data Mining and Algorithms.

Riordan, D., BSc, MSc (Port Elizabeth), PhD (Carleton), Intelligent Computer Systems.

Sampalli, S., BEng (Bangalore), PhD (Indian Institute of Science), Network Security, High-Performance routing and switching, Hybrid (wireless and optical) networks design, Active Networks, Secure Grid Computing.

Scrimger, J.N., BSc (UBC), MSc, PhD (Western), Image Processing & Graphics, Data Visualization, Animation.

Slonim, J., BSc, MSc (Western), PhD (Kansas), Electronic Commerce, Software Engineering Databases, Distributed Databases, Software Testing, Transaction Management, Software Architecture.

Smedley, T. J., BMath., MMath., PhD (Waterloo), Visual Programming Languages, Multimedia, User Interface Design.

Trappenberg, T., MSc, PhD (RWTH Aachen), Computational Neuroscience, Machine Learning, Data analysis and modeling, Classification, Pattern recognition, Learning and memory.

Watters, C.R., BSc, MSc, MLS (Western), PhD (TUNS), Dean, Faculty of Graduate Studies (Dal), Information Retrieval, Web Information Systems, Virtual Documents, Hypertext.

Associate Professors

Heywood, M., BEng (Plymouth), PhD (Essex), Genetic Programming; Neural Networks; Pattern Recognition, Evolutionary gaming.

Keselj, V., BSc (Belgrade), MSc, (Waterloo), PhD (Waterloo), Natural language processing, Text mining, Information Retrieval, Multiagent Systems, Algorithmic number theory.

Sedgwick, A.E., MSc, PhD (Toronto), Programming Language Programming Methodology.

Zincir-Heywood, A.N., BSc, MSc, PhD (Ege U), Network Security, Network management and Network information retrieval.

Assistant Professors

Arnold, D., Diploma (Dortmund), MSc (Simon Fraser), PhD (Dortmund), Evolutionary computation, optimization, physically-based modeling

Beiko, R.G., B.Sc. (Dalhousie), Ph.D. (Ottawa), Computational biology, Graph algorithms, Machine learning, Evolutionary algorithms, high-performance computing.

Blouin, C., BSc (Laval), PhD (Dalhousie), Protein evolution and biophysics, algorithms, phylogenetics, high-performance computing, statistical mechanics, molecular modeling

Blustein, J., BSc, MSc, PhD (Western), Hypertext and digital libraries, human-computer interaction.

Brooks, S., B.Sc. (Brock), M.Sc. (UBC), Ph.D. (Cambridge), Computer graphics, Non-photorealistic rendering, Image editing and 3D geospatial information systems.

Chiasson, T., BSc (Brandon), MSc, PhD (Dalhousie), Distributed transaction coordination, distributed systems, electronic commerce, security

Cox, A., BTech (Ryerson), MMath, PhD (Waterloo), Techniques, tools and environments for program program development and maintenance

Zeh, N., MCS (Dipl-Inf)(Friedrich-Schiller-Universitaet Jena), PhD (Carleton), Algorithms and data structures, I/O-efficient and cache-oblivious algorithms, parallel algorithms, graph algorithms, computational geometry

Adjunct Professors

Cercone, N., BSc (Univ. of Steubenville, ON), MSc, (Ohio State), PhD (Alberta), Dean of Computer Science, Artificial Intelligence (included automated natural language understanding, computational linguistics), Knowledge-based systems (including database learning and discovery), Human-Machine Interfaces (including natural language and multimedia interfaces).

Cramer, M., BA (UCLA), BS, MS (California Inst of Technology), PhD (Waterloo)

Dobcsanyi, P., MSc (Jozsef Atilla), PhD (Auckland)

Fisher, M., MSc (McMaster), PhD (York)

Hartzman, C.S., MSc (Toronto), PhD (Colorado)

Hu, X., BSc (Wuhan), MEng (Chinese Acad. Science), MSc (SFU) PhD (Regina), Data mining, web mining, data mining in bioinformatics and Biomedical domain, OLAP, e-business applications
Hussain, S., MSc (KFUPM), PhD (Manitoba)
Jutla, D., PhD (TUNS), Saint Mary's University, E-commerce, business models in e-commerce, transactional middleware for e-commerce, customer care in e-commerce, transaction support, hardware caches, operating system support for databases.
Kuruvila, J., BEng (Karnataka), MCIS (Queens)
Leathers, B., PhD (Cornell)
Liscano, R., BScEng (UNB), MScEng (Rhode Island), PhD (Waterloo)
Lyons, K., MSc, PhD (Queens)
Marchand, Y., MCS (Paris), DEA (Caen), PhD (Compiegne)
Oore, S., BSc (Dal), MSc, PhD (Toronto)
Shakshuki, E. MAS, PhD (Waterloo)
Silver, D., MSc, PhD (Western)
Wang, H., MSc, PhD (Toronto)
Wong, A.K.C., BSc, MSc (Hong Kong), PhD (CMU), Knowledge-based systems, computer vision, intelligent and vision-based Robotics
Ye, Q., MEngr (HIT), PhD (Alberta)
Yesha, Y., BSc (York), MSc, PhD (Ohio)

Cross Appointments

Brown, J., MSc, PhD (Toronto), Mathematics and Statistics
Duffy, J., School of Business Administration
Gu, J., Electrical and Computer Engineering
MacDonald, N., HBSc (Queen's), MSc (Ottawa), MD, FRCPC, Faculty of Medicine.
Marche, S., BA (Royal Military College), Professional Diploma (Alberta), MED (Alberta), PhD (London School of Economics), School of Business Administration
Mitnitski, A., Faculty of Medicine
Selinger, P., Mathematics and Statistics
Toms, E., School of Business Administration
Wach, G., Earth Sciences

Instructor

Kalyaniwalla, N., B.Sc. (Bombay), Ph.D. (Reusselaev), Stochastic network analysis, C.S. education

I. Introduction

The Faculty of Computer Science offers both masters and doctoral degree programs. The masters program is available either with a traditional research-oriented thesis option, or with a project option and more courses designed for students interested in an advanced professional degree. Research in the Faculty has an interdisciplinary approach and addresses a number of areas. Please see the Faculty website for information on these research areas. There are approximately 35 full-time professors in the Faculty, and approximately 200 students registered in the masters and doctoral programs.

The Faculty of Computer Science, has a permanent home in a building completed in the autumn of 1999. Graduate computing facilities include a network of Unix workstations, Windows PCs, and Macintosh computers. A major infrastructure grant from the Canadian Foundation for Innovation (CFI) had made possible the development of an extensive research computing infrastructure. The primary research server in the Faculty is a Sun Enterprise 4500 with eight UltraSPARC-II processors and 3GB of memory. This server was purchased with funds provided by the CFI grant. Other CFI equipment includes a Sun Ultra Enterprise 450 server with two UltraSPARC-II processors and 1GB of memory for the Health Informatics research group and an IBM RS/6000 running Tivoli Storage Manager to provide reliable backup of research data. In the summer of 2002 CFI provided the Faculty with a SunFire 4800 server with 12 UltraSPARC-III processors and 48 GB of memory. CFI is not the only supplier of research infrastructure in the Faculty. Research in parallel computing is carried out using a 32 node Linux cluster funded jointly by the Faculty, Carleton University and NSERC. The individual nodes have the horsepower of a small server with two Intel Pentium IV processors, 1 GB of memory, and 80 GB of storage each. The Web Information Filtering Lab received a donation of 10 Ultra 10 workstations and an Ultra 60 server from Sun Microsystems. Our Network Performance Lab is equipped with network testing software, Cisco routers, and ATM switches funded by the Canadian Institute for Telecommunications Research (CITR) for developing secure virtual private networks. Our Electronic Commerce Lab utilizes award winning e-business software to research new concepts in online commerce and web services. The Faculty of Computer Science building houses a fast, secure, fully-switched network. Each workstation is connected via a dedicated 10Mbps connection with the major servers interconnected via dedicated 100 Mbps full-duplex connections or Gigabit Ethernet running over optical fibre. Gigabit Ethernet serves as the backbone of the network with a connection to CA*net4, the world's first national optical R&D network. On the horizon for the Faculty are plans to devise a wireless networking infrastructure and to equip our Usability Lab with state-of-the-are video recording and editing equipment to study human-computer interaction.

NOTE: Completion of any or all software engineering classes offered by the Faculty of Computer Science does not qualify persons to hold the designation "Professional Engineer" as defined by various Provincial Acts governing the Engineering Profession.

The most up-to-date information on our graduate programs, admission requirements, academic regulations, graduate classes and research activities is available on the following website: http://www.cs.dal.ca (graduate, research, classes).

II. Graduate Degree Programs

Please contact the Faculty of Computer Science Website at http://www.cs.dal.ca/ for information concerning updates to the regulations.

A. Master of Computer Science

1. Admission Requirements

To be admitted to the Master program with a thesis option (MCSc) or project option (MACSc) all students must have completed an undergraduate program in Computer Science with high standing. Their Computer Science background must be at least equivalent to that covered by the core classes in the Dalhousie Bachelor of Computer Science program. Students who do not meet these requirements may be required to take additional specific undergraduate classes to make up deficiencies in addition to their graduate program requirements.

Students who have completed, with high standing, an undergraduate program in a discipline other than computer science may be admitted to a qualifying year or two-year program. Such students are normally required to take specified undergraduate classes to make up deficiencies in core Computer Science subjects.

2. English Language Proficiency Requirement

Information pertaining to the English language proficiency requirement is given in the "Faculty of Graduate Studies Regulations" section of the Calendar. For admission into graduate programs in Computer Science those students who must supply a TOEFL, must obtain a score of at least 580 on the TOEFL examination.

3. Information and Application Forms

For further information consult the World Wide Website listed above or contact the Chair of the Computer Science Graduate Committee at (902) 494-6438. Application forms may be obtained from:

Office of the Registrar
Dalhousie University
Halifax, N.S., Canada
B3H 4H6

Paper application forms can be ordered by sending an email to admissions@dal.ca. Application forms are also available for downloading on the following website: http://www.cs.dal.ca (graduate).

To hold your seat in the program for which you were admitted, we require a non-refundable $250 deposit (to be paid to Student Accounts) a full 30 days in advance of the starting date for the term of admittance. The $250 deposit will be applied towards your tuition.

4. Academic Regulations

Program Requirements
Students are admitted into either MCSc (Thesis) or MACSc (Project). The thesis option is a research-oriented degree, and a research master's degree is normally required to gain subsequent admission into a PhD program at most universities. Candidates' program of studies must be approved by the Faculty of Computer Science and the Faculty of Graduate Studies and must satisfy the breadth requirement of the Faculty of Computer Science.

Students in the project option who show excellent performance in classes and promise for research can apply to switch to the thesis option.

There are no core required graduate classes or concentration streams. Graduate classes are classified into three different areas:

Area 1: Classes with focus on mathematical abstractions and reasoning that are foundational in computer science.

Area 2: Classes focusing on tools and processes in computing independent of application.

Area 3: Classes with links to disciplines outside computer science and applications.

The breadth requirement in class selection for both the thesis and the project option consists of: at least one class in each area.

Master of Computer Science
An MCSc consists of not less than six half-credit classes or their equivalent, and a thesis selected upon the advice of the thesis supervisor. The thesis is equivalent to two credits.

The thesis shall be written under the guidance of a thesis supervisor, and must be satisfactory to an examining committee established by the Faculty. The candidate must present an oral thesis defence.

Master of Applied Computer Science
A MACSc consists of not less than eight half-credit classes or their equivalent and a well defined project. The project is equivalent to one credit.

The project shall be carried out under the direction of a project supervisor and must be satisfactory to the supervisor and another faculty member before approval is granted. The candidate must give an oral presentation of the project.

Time Requirement
A student is required to register each session to maintain eligibility to continue in the program. Students who enter the program meeting normal admission requirements may be able to satisfy the requirements in 16 months. For information on maximum time limits for completion, leaves of absence, and extensions, see the Faculty of Graduate Studies Regulations in this calendar.

B. Master of Electronic Commerce

The Faculty of Computer Science in partnership with the Faculties of Management and Law offer the degree of Master of Electronic Commerce.

Electronic Commerce is a discipline whose underpinnings lie equally in technology, business, and social and economic policy. Distinct from any of the disciplines that comprise it, this multi-disciplinary two-year program consists of core classes, stream classes, an industrial internship, and a project. Students study core topics in each of the three areas and concentrate in depth in one of them by choosing one of three streams of study: Technology, Business and Policy.

The program may also offer the student an opportunity for study abroad at other member universities of an international consortium mandated and endorsed by the G7 to develop a Global Master of Electronic Commerce. The core of this program is intended to be common throughout the consortium with institutions offering classes outside the core, according to their individual strengths. Dalhousie University is the only Canadian participant in this international consortium.

For a complete description of this program please see the Electronic Commerce entry in this calendar. Please also visit the program's website at http://www.ecomm.dal.ca for information concerning updates to the program's regulations and class offerings. Email queries to can be addressed to mec@cs.dal.ca.

C. Master of Health Informatics

The Faculty of Computer Science, in partnership with the Faculty of Medicine, offers the degree of Master of Health Informatics.

Health Informatics studies the use of computing and information technology in health research, education, patient care, policy setting and health services administration. This interdisciplinary program draws on resources across the University, including faculty and courses from the Faculties of Computer Science, Medicine, Management, and Health Professions.

For a complete description of this program, please see the Health Informatics entry in this calendar. Please also visit the program website at: http://www.healthinformatics.dal.ca/ for more information.
Email queries can be addressed to hinf@cs.dal.ca.

D. Master of Science in Computational Biology and Bioinformatics

The program is an interdisciplinary master's degree with an emphasis on thesis work which focuses on tackling problems in biology, molecular biology and health-science related fields through significant research contributions in mathematics, statistics and computer science. This program is set within the framework of current interdisciplinary research conducted within Dalhousie. Students in this program will join a community of researchers in the fields of computational biology and bioinformatics.

Resources from the faculties of Computer Science, Medicine and Science are coordinated to offer a flexible program, with a limited course load and an emphasis on research activities. Students from a broad selection of backgrounds are invited to consider the program. Each candidate is supervised within the research group of their supervisor from the beginning of their tenure.

E. Doctor of Philosophy Degree

1. Admission Requirements

To be admitted, students must have completed a research (thesis) Master's degree program in Computer Science, or equivalent and must meet the admission requirements of the Faculty of Graduate Studies. In exceptional circumstances, a student may be admitted into the MCSc (Thesis) program with the possibility of transferring to the doctoral program within the first 15 months (subject to approval of the Graduate committee and the Faculty of Graduate Studies). Students with an honours Bachelor's degree and strong promise in research may be admitted into the post-Bachelor PhD program.

2. English Language Proficiency Requirement

Information pertaining to the English language proficiency requirement is given in the "Faculty of Graduate Studies Regulations" section of the Calendar. For admission into graduate programs in the Faculty of Computer Science those students who must supply a TOEFL, must obtain a score of at least 580 on the TOEFL examination.

3. Information and Application Forms

For further information consult the World Wide Website at http://www.cs.dal.ca/ or contact the Chair of the Computer Science Graduate Committee at (902) 494-6438. Application forms may be obtained from:

Office of the Registrar
Dalhousie University
Halifax, N.S., Canada
B3H 4H6

or on the web at www.dal.ca/apps.

To hold your seat in the program for which you were admitted, we require a non-refundable $250 deposit (to be paid to Student Accounts) a full 30 days in advance of the starting date for the term of admittance. The $250 deposit will be applied towards your tuition.

III. Graduate Classes

A selection of the following graduate classes is offered each year. Consult the Faculty of Computer Science's Class Information System, on the World Wide Web at http://www.cs.dal.ca/, for the selection of classes offered in each academic year.

Classes starting with "CSCI" are computer science classes.

All graduate students are required to attend and participate in regular Faculty seminars.

Graduate students can take any graduate class by permission of the instructor and the Graduate Committee.

CSCI 5802.03: Algorithms in Bioinformatics.

The discipline of bioinformatics applies sophisticated computational and statistical techniques to problems in the biological domain. This course will focus on a few biosequence-related challenges in depth, examining the complexity and efficiency of different approaches, the relationship between statistical optimality and biological reality, and the consistency (or lack thereof) among methods.
FORMAT: Lecture/tutorial

CSCI 6101.03: Advanced Topics in Analysis of Algorithms.

This research oriented class covers advanced material in the design and analysis of algorithms. It combines mathematically rigorous coverage of traditional topics with recent research results. Problems are taken from a wide range of areas including combinatorics, numerical computation, graph algorithms, string matching, approximation algorithms, computational geometry, NP-completeness.
PREREQUISITE: CSCI 3110 or equivalent
EXCLUSION: COMP 5130.03

CSCI 6102.03: Computational Geometry.

This class presents fundamental algorithms and data structures for solving geometric problems. Basic algorithm types include divide-and-conquer, sweep, incremental construction, and randomized construction. Typical topics include geometric representations, triangulations, convex hulls, Voronoi diagrams, Delaunay triangulations, point location structures, and line arrangements.
PREREQUISITE: CSCI 3110.03

CSCI 6103.03: Network Reliability.

Networks are useful models for the transmission of essential data, and it is often crucial that the network be resilient to the loss of some lines. We investigate here the reliability of such networks, including both directed and undirected models, assuming that the lines fail independently with a given probability.
INSTRUCTOR(S): Brown, J.I.
FORMAT: Lecture
PREREQUISITE: CSCI 3110, CSCI 4115, MATH 2060

CSCI 6104.03: Algorighms and Data Structures for Massive Data Sets.

This course covers algorighms and data structures designed to alleviate the I/O-bottleneck that arises when dealing with massive data sets. The focus is on general techniques. These techniques are illustrated using applications to fundamental problems, including problems from computational geometry and graph theory.
INSTRUCTOR(S): Zeh, N.
FORMAT: Lecture
PREREQUISITE: CSCI 3110.03

CSCI 6301.03: Computer Software: Requirement Analysis and Specification.

This class will cover the early stages of the system lifecycle. Topics will include needs analysis, software as a system component, the form of a software requirements specification and validation and verification of specifications. A mathematically based formal specification language will be introduced.
PREREQUISITE: CSCI 3130.03 or equivalent

CSCI 6302.03: Computer Software: Development and Design.

This class will concentrate on the design phase of the software lifecycle, in particular for large scale software development. Topics will include software process models, computer aided software engineering (CASE) tools and how to evaluate a design. It will also include the supporting technologies of configuration management, version control and change management. Testing will also be discussed.
PREREQUISITE: CSCI 3130.03 or equivalent

CSCI 6304.03: Visual Programming.

This class deals with topics relating to the use of visuality in programming. This will include topics such as visual programming languages, program visualization and data visualization, as well as discussion of graphical programming aids, including graphical tools for defining user interfaces.

CSCI 6306.03: Topics in Program Comprehension.

This class explores current issues in program comprehension 0 the process of acquiring sufficient knowledge about a software system in order to perform a specified maintenance task. Topics include, but are not limited to, software visualization, design extraction, cognitive theories of comprehension, configuration management, information representation and comprehension tools.

CSCI 6401.03: Distributed Databases.

The class will briefly review the concepts of integrated database systems, computer networks, and distributed processing. The problems and opportunities inherent in distributed databases on a network computer system will be presented. Detailed coverage will be given to topics such as resource allocation, directory systems, deadlock detection and prevention, synchronization, query optimization, and fault tolerance.
PREREQUISITE: CSCI 3140.03 or equivalent

CSCI 6403.03: Advanced Topics in Information Retrieval.

This class presents students with the latest research topics in the field of Information Retrieval. Information Retrieval is the study of the collection, organization, and dissemination of text-based objects, such as books, articles, and newspaper items. Topics may include advanced issues in hypertext, information filtering, information access on the World Wide Web, delivery of electronic news, and digital libraries. Most topics will be viewed in the framework of distributed information systems on the Internet.

CSCI 6404.03: Web Information Systems.

Topics include web models, hypertext functionality, virtual documents, and software design issues for large scale web information systems.
PREREQUISITE: CSCI 3120.03 or 4172.03

CSCI 6405.03: Data Mining and Data Warehousing.

This class gives a basic exposition of the goals and methods of data mining and data warehouses, including concepts, principles, architectures, algorithms, implementations, and applications. The main topics include an overview of databases, data warehouses and data mining technology, data warehousing and on line analytical process (OLAP), concept mining, association mining, classification and predication, and clustering. Software tools for data mining and data warehousing and their design will also be introduced.

CSCI 6406.03: Visualization.

This course focuses on graphical techniques for data visualization that assist in the extraction of meaning from datasets. This involves the design and development of efficient tools for the exploration of large and often complex information domains. Applications of visualization are broad, including computer science, geography, the social sciences, mathematics, science and medicine, as well as architecture and design. The course will cover all aspects of visualization including fundamental concepts, algorithms, data structures, and the role of human perception.
FORMAT: Lectures, Seminars and Discussion

CSCI 6501.03: Intelligent Systems.

Topics covered include knowledge representation, inference mechanisms and search strategies, uncertain reasoning, explanation, induction and evaluation. Students are provided with a selection of readings on these topics. Small expert systems are developed using different development tools with the goal of obtaining a working knowledge of available development tools. A small expert system shell is developed using PROLOG.
EXCLUSION: COMP 5210.03

CSCI 6505.03: Machine Learning.

Machine Learning is the area of Artificial Intelligence concerned with the problem of building computer programs that automatically improve with experience. The intent of this course is to present a broad introduction to the principles and paradigms underlying machine learning, including discussions of each of the major approaches currently being investigated. Main topics covered in the course include a review of information theory, unsupervised learning or clustering (the K-means family, co-clustering, mixture models and the EM algorithm), supervised learning or classification (support vector machines, decision trees, rule learning, Bayesian learners, meximum entropy, ensemble methods), feature selection and feature transformations. The focus of applications that will be discussed will be text classification and clustering.
PREREQUISITE: CSCI 3150.03 or 4150.03 (Artificial Intelligence) or permission of the instructor.

CSCI 6506.03: Genetic Algorithms and Programming.

The concept of stochastic search algorithms is introduced by way of answers to the generic machine learning requirements: representation, goal state, and credit assignment. Schema theory is introduced as an underlying model for evolutionary problem solving. The significance of assuming different representations is investigated through various case studies. Different forms of 'goal state' are investigated, including multi-objective models and co-evolution are investigated in some detail and demonstrated to provide the basis for problem decomposition, game behavior design and computational efficiency.

CSCI 6508.03: Fundamentals of Computational Neuroscience.

This course introduces the principles of information processing in the brain, including the functionality of single neurons, networks of neurons, and large-scale neural architectures for specific cognitive functions. Specific topics include information theory, memory, object recognition, adaptive systems, vision, motor control, and an introduction to MATLAB.
INSTRUCTOR(S): Trappenberg, T.P.
FORMAT: Lecture
PREREQUISITE: Permission of the instructor

CSCI 6509.03: Advanced Topics in Natural Language Processing.

Natural Language Processing (NLP) is an area of Artificial Intelligence concerned with the problem of automatically analyzing and generating a natural language, such as English, French, or other, in written or spoken form. It is a relatively old area of computer science, but it is still a very active research area. This class introduces fundamental concepts and principals used in NLP with emphasis on statistical approaches to NLP and unification-based grammars. In the application part of the class, we discuss the problems of question answering, machine translation, text classification, information extraction, grammar induction, and dictionary generation and other.
INSTRUCTOR(S): Keselj, V.

CSCI 6514.03: Search and Optimization.

This class provides a broad overview of strategies for tackling difficult optimization problems that occur in computer science, in the engineering sciences, and beyond. It covers “classical” algorithms such as conjugate gradient strategies as well as more recent, nature-inspired approaches including evolutionary methods and simulated annealing. Its goal is to not only introduce the various paradigms, but to contrast them and to critically evaluate their respective merits based on a mathematically founded understanding of their properties. A research project to be worked on individually or in groups will be a major component of the class.

CSCI 6602.03: Digital Image Processing.

This class deals with important topics of digital picture processing including visual perception, digitization, compression, enhancement, restoration, reconstruction and segmentation. Special applications to medical systems will also be discussed.

CSCI 6604.03: Advanced Computer Graphics.

This class deals with advanced issues of 3D computer graphics. Topics include solid modeling, visible-surface determination, ray tracing, illumination, shading, and rendering. Animation techniques and problems will also be discussed.
PREREQUISITE: CSCI 4160.03

CSCI 6606.03: Human Factors in On-Line Information Systems.

Introduction to issues related to behavioral/human aspects of computing as applied to hypertext and other on-line information tools.

CSCI 6702.03: Parallel Computing.

This class explores various aspects of parallel computing including parallel architectures, systems, programming languages and implementation issues. It focuses on solving real problems on existing parallel machines. Students will participate in an implementation of a significant parallel computing project.

CSCI 6704.03: Advanced Topics in Networks.

The primary focus of this class is to provide a comprehensive coverage of emerging and emergent network technologies that lay the foundation for the design of next generation high-performance global internetworks. Topics covered include advanced TCP/IP design, ATM protocols, Gigabit Ethernets, IPv6 networks and protocols, Secure Networks and VPNs, Wireless Networks, Optical Networks, and Internetwork Architecture Case Studies.
PREREQUISITE: CSCI 4171.03 or equivalent
EXCLUSION: COMP 5550.03

CSCI 6706.03: Network Design and Management.

The distributed enterprise information system consisting of workstations, servers, bridges, routers, hubs, Internet and interactive Web technology is critical to corporate productivity. This class explores how Information Technology (IT) can be used to manage an enterprise. It further examines how managers can strategically use IT to capture and deliver knowledge more efficiently and to create a competitive advantage.
PREREQUISITE: CSCI 4171.03

CSCI 6707.03: Knowledge Management: Concepts and Techniques.

Knowledge Management (KM) offers a computational approach to identifying, capturing, retrieving, and sharing an enterprise's tacit and explicit knowledge assets. This course will provide a conceptual understanding of KM practices and enabling intelligent techniques to develop and deploy KM solutions in an enterprise setting.
FORMAT: Lecture
PREREQUISITE: Understanding of artificial intelligence is recommended

CSCI 6801.03: Computational Biology and Bioinformatics.

This course is an introduction to current problems and techniques in computational biology and bioinformatics. The emphasis is put in the following themes: sequence analysis, phylogentics inference and structural biology. No biiological background is assumed althought the course covers many relevant biological concepts.`
INSTRUCTOR(S): Blouin, C.
FORMAT: Lecture/seminar
RESTRICTION: Graduate student in Computer Science or Instructor's approval.

CSCI 6901.03: Directed Studies.

This class offers the student the opportunity to undertake further study into a specific topic of interest that is not covered in the regular class offerings. The student will be supervised by a faculty member competent in the area of interest. Regular meetings between the student and supervising faculty will be held. A substantial project and report are required.
PREREQUISITE: Permission of the Graduate Committee

CSCI 6902.03: Doctoral Directed Studies.

This class offers the doctoral student the opportunity to undertake further study into a specific topic of interest that is not covered in the regular class offerings. The student will be supervised by a faculty member competent in the area of interest. Regular meetings between the student and supervising faculty will be held. A substantial project and report are required.
PREREQUISITE: Permission of the Graduate Committee

CSCI 6903.03/6904.03/6905.03/6906.03/6907.03/6908.03: Special Graduate Topics in Computer Science.

This graduate class examines topics determined by the interests of the students and the instructor.

CSCI 6904.03/6905.03/6906.03/6907.03/6908.03: Special Graduate Topics in Computer Sciences.

CSCI 7000X/Y.06: Research Project in Computer Science.

The class provides the students in the Master of Applied Computer Science program with an opportunity to conduct a research project under the supervision of a faculty member. Regular meetings between the student and the supervising faculty will be held. A project report and open presentation are required.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

CSCI 7900X/Y.06: Directed Doctoral Research Project.

This class provides doctoral students with an opportunity to conduct a research project under the supervision of a faculty member leading to the research aptitude examination. Regular meetings between the student and the supervising faculty will be held. A project report and oral defense to a committee are required.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

CSCI 9000.00: Graduate Thesis.

Earth Sciences

Location: Life Sciences Centre, Room 3006
1355 Oxford Street
Halifax, NS B3H 4J1
Telephone: (902) 494-2358
Fax: (902) 494-6889
Email: earth.sciences@dal.ca
Website: http://earthsciences.dal.ca

Chair of Department

Gibling, M.R.

Graduate Co-ordinator

Culshaw, N.

Professors

Gibling, M.R., BA (Oxon), PhD (Ottawa). Sedimentology and sequence stratigraphy of alluvial and coastal strata, Atlantic Canada; Coal and oil shale; Quaternary rivers.

Jamieson, R.A., BSc (Dal), PhD (MUN). Metamorphic geology and tectonics: P-T-t paths with Appalachian and Grenville applications; metamorphism, structure, geochemistry of gneiss associations, Grenville Province.

Scott, D.B., BSc (Wash), MSc (Wash State), PhD (Dalhousie). Micropaleontology and marine geology: microfossils for use in environmental geology of coastal areas; deep- sea paleo-oceanography

Wach, G.D., BA (UWO), MSc (South Carolina), PhD (Oxford). Petroleum geology, sequence strategraphic, seismic well log, basin analysis, sedimentology, depositional environments

Associate Professors

Culshaw, N.G., BA (Keele), PhD (Ottawa). Structural geology and tectonics: Grenville Province; Meguma terrane, Nova Scotia; Makkovik Province, Labrador

Gosse, J.C., BSc (MUN), PhD (Lehigh Univ.). Cosmic nuclide dating, surficial processes, landscape evolution, quaternary paleoclimatology, glacial geology, tectonic geomorphology

Grujic, G., BSc (Belgrade), PhD (ETHZurich). Tectonics, meta morphism, magmatism, thermochronology, analogue modelling, geodynamics, convergent margins, Himalayas

Nedimovic, M., BSc (Univ. of Belgrade), MSc, PhD (Toronto). Seismic reflection; Seasmic imaging of the ocean crust off Eastern Canada

Ryall, P.J.C., BSc (Dal), MSc (Alta), PhD (Dal). Geophysics: magnetic properties of ocean crust; gravity surveys

Assistant Professors

Fedortchouk, Y., MSc (Moscow State Univ.), PhD (Victoria). Petrology and geochemistry of igneous rock.

Plug, L.J., BA (McGill), PhD (Alska-Fairbanks). Surface processes, pattern formation, nonlinear depramics, climate change

Research Associates

Brown, D., BSc (Dalhousie) Canada-NS, Offshore Petroleum Board.
Clair, T., BSc (Mt. Allison), MSc (Ottawa), PhD (McMaster)
Coutand, I., BSc, PhD (Univ of Rennes, France), Univ. de Lille
Grist, A., BSc (Dalhousie), MSc (Dalhousie), PhD (Dalhousie)
Jansa, L., BSc, MSc (Masaryk State U, Czechoslovakia), PhD (Charles Univ., Prague)
Kosters, E., BSc (Groningen), MSc (Univ of Amsterdam & Utrecht), PhD (Louisiana State Univ)
Ruffman, A., MSc (Dal), Geomarine Associates Ltd.
Shaw, J., BSc (Queen's Univ, Belfast), MSc, PhD (The New Univ of Ulster), GSC Atlantic
Shimeld, J., B.Applied Sci (Waterloo), MSc (Dalhousie)

Stockli, D., BSc, MSc (Swiss Federal Inst. of Tech, Eth), PhD (Stanford Univ), Univ of Kansas
Waldron, J., BA (Cambridge), PhD (Edinburgh), University of Alberta
White, C., BSc (Acadia), MSc (Dalhousie), PhD (Dalhousie), NS Dept. of Natural Resources
Williams, G., BSc (London), PhD (Sheffield), GSC Atlantic

Adjunct Professors

Adam, J., Dip.m Geology, (Univ. of Claushal), PhD (Tech. Univ. of Berlin), Dalhousie.
Anderson, A., BSc (Univ. of Windsor), MSc (Manitoba), PhD (Queen's), St. Francis Xavier University
Barr, S., BSc (UNB), PhD (UBC), Acadia University
Beltrami, H., BSc (Winnipeg), MSc (Queen's), PhD (U du Quebec à Montreal), St. Francis Xavier University
Calder, J., BSc (Saint Mary's), PhD (Dal), NS Natural Resources
Clarke, B., BSc, MSc (Toronto), PhD (Edinburgh)
Dehler, S., BSc (Calgary), MSc, PhD (UBC), BIO
Deptuck, M., BSc (ST. Mary's), PhD (Dalhousie)
Dostal, J., BSc (Charles), PhD (McMaster), Saint Mary's University
Fensome, R., BSc, MSc (Sask), PhD (Nottingham) GSC Atlantic
Godfrey-Smith, D., BA (Calgary), MA (Simon Fraser), PhD (Simon Fraser), DRDC
Jones, P.E., BSc, MSc, PhD (UBC), BIO
Jutras, P., BSc (Univ. de Montréal), MSc (Univ. du Québec à Montréal), PhD (Univ. du Québec à Montreal), St. Mary's University
Kellman, L., BA (McMaster), MSc (McGill), PhD (U du Quebec à Montreal), St. Francis Xavier University
Kettanah, Y., BSc (Baghdad Univ), PhD (Sorethampton Univ., UlK.), Dalhousie University.
Kontak, D.J., BSc (St. FX), MSc (Alberta), PhD (Queen's), NS Department of Natural Resources
Krezsek, C., BSc, MSc, PhD (Babes-Bolyai Univ., Romania)
Kronfeld, J., BA (Queens College, NY), MSc (Florida State), PhD (Rice) Tel Aviv University
Laroque, C., BSc (Sask), MSc, PhD (Univ of Victoria), MT. Allison University
Melchin, M., MSc (Waterloo), PhD (Western), St. Francis Xavier University
Mosher, D., BSc (Acadia), MSc (Memorial), PhD (Dalhousie)
Mudie, P.J., BSc (Cape Town), BSc (Leicester), PhD (Dal), GSC Atlantic
Mukhopadhyay, P.K., PhD (Jadaupur), Global Geoenergy Research
Murphy, J.B., BSc (Dublin), MSc (Acadia), PhD (McGill), St. Francis Xavier University
Parsons, M., BSc (Dal), PhD (Stanford), BIO
Pe-Piper, G., BSc (Athens), PhD (Cambridge), Saint Mary's University
Piper, D.J.W., BA(Hons) (St Catharine's Col, Cantab), MA (Cantab), PhD (Darwin Col, Cantab), GSC Atlantic
Reynolds, P., BSc (Toronto), PhD (UBC)
Risk, M., BSc, (Toronto), MSc (Western Ontario), PhD (Univ of S. California)
Robinson, P.T., BSc (Mich), PhD (Calif).
Rochon, A., BSc, MSc, PhD (U du Quebec à Montreal), BIO
Salisbury, M.H., BSc (MIT), MSc, PhD (Wash), GSC Atlantic
Siddiqui, Q., BSc (Lucknow), MSc (Lucknow), PhD (Leister)
Stea, R., BSc (Acadia), MSc, PhD (Dal), NS Dept of Natural Resources
Wielens, H., BSc, MSc, PhD (UTRECHT State Univ), GSC Atlanta

I. Introduction

Students with degrees in any of the sciences or mathematics who wish to study some aspect of the earth are welcome. Graduate work leading to the degrees of MSc and PhD is possible in a number of different fields. These include for example: marine geology and geophysics, Appalachian geology, isotope geology, economic geology, petrology, geochemistry and mineralogy, geophysics, sedimentology, micropaleontology and coastal sedimentation, structural geology, metamorphism, and tectonics.

Interdisciplinary studies are encouraged, and there is active cooperation among the science departments (including Oceanography) at Dalhousie University. Students are urged to take full advantage of the opportunities this affords. Research, on scientific problems of mutual interest to Dalhousie and government laboratories such as the Nova Scotia Department of Natural Resources, and the GSC Atlantic at the Bedford Institute of Oceanography, is often done. Members of these laboratories frequently serve on supervisory committees.

The complex of departments and laboratories in Halifax and Dartmouth concerned with various aspects of the Earth make graduate study in Earth Sciences very attractive.

II. Admission Requirements

Candidates must satisfy general requirements for admission to the Faculty of Graduate Studies. Candidates seeking financial support should ensure that their applications are complete by January 31.

III. Degree Programs

A. MSc Degree Program

The minimum time for completion of the MSc degree is 12 months of full-time study (see Faculty of Graduate Studies regulations, Section 1.3.1, page 19). Experience has shown that most students take at least 24 months to complete their work. Financial support is available for no more than 24 months.

Part-time study is also possible. Conditions for admission to this program are the same as those for full-time students. Financial support is not normally available for part-time study.

Research leading to the preparation and oral defence of a thesis is required.

The equivalent of five graduate classes is required, of which the thesis normally counts as three.

Graduate students are expected to attend the Earth Sciences seminars. ERTH 6300.03 and ERTH 6350.03 are compulsory. A grade of B+ or better is required in these two classes to transfer to PhD.

B. PhD Degree Program

The minimum time required to complete this program is two years from an MSc; normally three years are required (see Section 1.3.2, page 19 in the Faculty of Graduate Studies regulations).

The preliminary examination (see Faculty of Graduate Studies regulations) is an integral part of the compulsory classes, ERTH 6300.03 and 6350.03. A grade of B+ or better is required in these two classes.

Attendance at the Earth Sciences seminars is expected.

Research leading to the preparation and oral defence of a thesis is required.

IV. Class Descriptions

A. Required Graduate Classes

ERTH 6300.03: Research Design and Scientific Presentation.

This is a required class (full-year, half-credit) for all new graduate students (M.Sc. and Ph.D.) in the Department of Earth Sciences. It is intended to introduce students to the essential features of good research design, and to give them extensive practice in presenting their research to their peers. Topics covered include the scientific method, critical reading, analysis of error and uncertainty, effective technical writing, effective scientific presentations (oral and written), effective research proposal design, and ethical issues in research. Other topics may be covered depending on students' interests and/or current issues in the field. A series of written and oral assignments takes students through the process of designing, writing, and presenting a short (10-page) formal research proposal, generally (but not necessarily) closely related to the thesis topic, which is then presented and defended before the entire department. Extensive feedback is given on both written and oral work throughout the year; all oral presentations and one written assignment involve an element of peer review.
INSTRUCTOR(S): R.A. Jamieson, J.C. Gosse

PREREQUISITE: Students must be registered in a graduate program (M.Sc. or Ph.D.) in Earth Sciences, which normally requires a B.Sc. (Honours) in Earth Science or its equivalent; other students may be admitted with the permission of the instructors.
CO-REQUISITE: Students should also be enrolled in ERTH 6350 (Graduate Module class) although in unusual situations the classes may be taken in consecutive years.

ERTH 6350.03: Research Topics in Earth Sciences.

This class consists of three or more modules that present topics of interest to students coming into the graduate program from a variety of backgrounds. The Geology of Nova Scotia Module is given each year and consists of lectures given by invited speakers and illustrative field excursions. The content of the other modules may change from year to year. Past and potential future topics include: Uranium Series Disequilibria, Mars Surface Processes, Radiometric Dating, Origin of Orogens, Basics of Basins, P-T-t Data From Orogenic Belts, Heat Flow, Granites - Physical and Chemical Processes, Mantle Petrology - Peridotites, Eclogites etc., Abnormal Fluid Pressures in Geology, Environmental Monitoring in Coastal Areas, Quaternary Geology of Nova Scotia, Chemical Weathering, Tectonic Geomorphology, Applications of Cosmogenic Isotopes.
Consult website at www.dal.ca/~es for a list of modules offered in current sessions.
INSTRUCTOR(S): N. Culshaw
PREREQUISITE: Students must be registered in a graduate program (M.Sc. or Ph.D.) in Earth Sciences, which normally requires a B.Sc. (Honors) in Earth Science or its equivalent; other students may be admitted with the permission of the instructors.
CO-REQUISITE: Students should also be enrolled in ERTH 6300 (Research Design and Scientific Presentation) although in unusual situations the classes may be taken in consecutive years.

ERTH 9000.00: MSc Thesis.

Students in the MSc Program must be registered in this class in every term.

ERTH 9530.00: PhD Thesis.

Students in the PhD Program must be registered in this class in every term.

B. Other Graduate Classes

The following classes are designed specifically for graduate students. They are offered when required, and their content is designed to suit the interests of individual students.

ERTH 6100.03: Seminar in Sedimentology and Stratigraphy.

ERTH 6110.03: Research Topics in Micropaleontology.

ERTH 6120.03/6220.03: Seminar in Mineralogy, Petrology and Geochemistry.

ERTH 6250.03: Directed Studies.

ERTH 6400.03: Geochronology and Thermochronology.

Researchers across the whole spectrum of earth science use chronometers, which provide information about the rates of geological processes in areas as diverse as the deep crust and modern surface environments. This is a required class (half-year, half-credit) for all new graduate students in the Department of Earth Sciences, and focuses on a major teaching and research strength of this department. Experience will be attained on a wide range of chronometers including U-Th-Pb, Ar-Ar, Apatite Fission Track, and (U-Th)/He thermochronology, cosmogenic and nuclide exposure dating, luminescence dating, and radiocarbon dating. The structure and content of the course will vary with instructor and student interests, but will feature lectures, seminars, workshops, laboratory work, and computation.
FORMAT: Lectures, seminars, workshops and labs
PREREQUISITE: Students must be registered in a graduate program (M.Sc or Ph.D)in Earth Sciences, which normally requires a BSc (Honors) in Earth Sciences or its equivalent. Other participants may be admitted with permission of the instructors.

ERTH 6500.03: Graduate Seminar in Tectonics.

C. Cross-Listed Graduate/Undergraduate Classes

The following classes are designed primarily for undergraduates in their final year; they may be taken by graduate students for general interest, because the material is needed to help in their research, or because the student's background may be inadequate. PLEASE NOTE: Not all classes are offered every year; please consult the current timetable.

ERTH 5141.03: Applied Geology, Mineralogy and Geochemistry.

This class is an introduction to various concepts and techniques used by geoscientists in the search for and evaluation of mineral concentrations, in mining and metallurgy, as well as in environmental aspects of these activities. The successive stages of a mineral exploration project are analyzed, from reconnaissance through exploration geochemistry, claim staking, drilling, mining, estimation of reserves, grades and tonnage, economic aspects, to mine site rehabilitation. Fundamentals of applied ore microscopy will be introduced, with emphasis on metallurgy, and acid rock drainage (ARD) prevention. The syllabus will vary somewhat from year to year to reflect the interests and backgrounds of the students, and the availability of visiting lecturers. The labs will consist of hands-on exercises, visits to analytical labs, problem solving, report writing, and seminar presentations by the students.
INSTRUCTOR(S): Staff
FORMAT: Lecture 3 hours, lab 3 hours
PREREQUISITE: ERTH 2001.03, ERTH 2002.03, ERTH 2110,03, ERTH 2000.015

ERTH 5151.03: Mineral Deposits.

This class is an introduction to the geology of metallic ore deposits (e.g. gold, copper) and some industrial mineral concentrations (.e.g. diamonds, barite), and the genetic hypotheses used in their exploration. Emphasis is given to the chemical, mineralogical, physical, structural, tectonic, igneous, sedimentary and metamorphic processes that lead to economic concentrations of minerals and their subsequent modification or destruction. The class integrates many Earth Science disciplines, and requires extensive reading from the scientific literature, writing, and oral presentations.
INSTRUCTOR(S): Staff
FORMAT: Lecture 3 hours, lab 3 hours

ERTH 5270.03: Applied Geophysics.

The application of geophysical methods to petroleum and mineral exploration as introduced in 2050.03 is here treated at a more advanced level with an emphasis on seismic techniques. Assignments involve the student in interpretation of industry geophysical data and modelling on workstations.
INSTRUCTOR(S): P.J.C. Ryall
FORMAT: Lecture 3 hours

ERTH 5280.03: Marine Geophysics.

The application of the various geophysical techniques to the study of the sea floor and the principal results obtained are examined. The processes involved in the creation, evolution and destruction of ocean basins and the implications of the experimental observations are also considered.
INSTRUCTOR(S): K. Louden
FORMAT: Lecture 3 hours, lab

ERTH 5350.03: Tectonics.

This is a required class for Earth Sciences Honors students. It is intended to synthesize the various aspects of geology covered in the third year core program. The focus of the class is on tectonic processes and the ways in which these processes create and modify the Earth's crust. We will cover the fundamental geological, geophysical, and geochemical controls that operate today, including plate tectonics, and the ways in which these might have differed in the geological past. The tectonic evolution of

specific orogenic belts will be discussed, including both modern and ancient examples in Canada and other parts of the world.
INSTRUCTOR(S): N. Culshaw
FORMAT: Lecture 3 hours

ERTH 5380.03: Advanced Geochemistry.

A basic understanding of Geochemistry is essential to a professional geoscientist who must deal with earth materials, igneous, metamorphic, and hydrothermal processes that take place under the surface of the earth and other planetary bodies, and on the minerals, rocks, fluids, and mineral deposits resulting from these processes. Equally important is a familiarity with the geochemistry of weathering, acid rock drainage (ARD) and the cycles of environmentally significant elements in ground and surface waters. This class begins with an overview of atoms, ions, and isotopes, and the principles that govern their distribution on the Earth and other planets. This will be followed by a discussion of high- and low-temperature aqueous geochemistry, and the applications of chemistry to igneous and metamorphic systems. A section on mineral deposits will examine the formation of hydrothermal ore deposits, and geochemical exploration methods. The latter half of the term will concentrate on low-temperature geochemistry, with an emphasis on processes that control the release, mobility, and fate of contaminants in the environment. Computer models and case studies will be used to illustrate the importance of geochemical data for solving real-world environmental problems. Students will also be introduced to a number of closely-related disciplines including surface science, geomicrobiology, and medical geology.
INSTRUCTOR(S): Staff
FORMAT: Lecture 3 hrs, seminars, workshops, student presentations
CROSS-LISTING: ERTH 4380.03

ERTH 5400.03: Advanced Metamorphic Petrology.

This class deals with selected topics in metamorphism and microtectonics, chosen to reflect current topics of interest in the disciplines and/or specific interests of participants. The focus is on the interaction of metamorphism and deformation, and on the constraints provided by microstructural and metamorphic data on tectonic processes in general. Examples of topics that might be covered include: porphyroblast-matrix relationships in metamorphic rocks; quantitative P-T methods in metamorphism; geochronology of metamorphic rocks; construction and interpretation of metamorphic P-T-t paths; intracrystalline deformation, recrystallisation, and deformation mechanisms in some common rockforming minerals; origin and interpretation of lattice-preferred orientation; natural microgauges. The class is offered as numbers warrant (4 students minimum). It is suitable for students who are doing honors or graduate work in the general areas of metamorphic and/or structural geology and/or tectonics.
INSTRUCTOR(S): R. Jamieson, D. Grujic
FORMAT: Lecture 3 hours
PREREQUISITE: ERTH 3020.03, ERTH 3140.03 or equivalent, or permission of instructor
CROSS-LISTING: ERTH 4400.03

ERTH 5450.03: Introduction to Landscape Simulation.

Spatially-extended computer models are tools for the investigation of landscape form and change, and for prediction of the response of landforms to ongoing changes in climate and human land use practices. This course examines and compares different approaches to modelling, including rule-based approaches. Selection of variables, sensitivity testing, and methods for testing models against nature are discussed. Recent models are used s examples, including those for erosion and deposition in braided rivers, topographic and thermal diffusion, cratering on Mars, fracture patterns in rock andpermafrost, and sliger-block models for saults. Programming experience isuseful but not essential; class emphasis lies in understanding the utility and limits of landscape models rather than numerical methods. Advanced students will develop simple models pertinent to their own research interests as a final project.
FORMAT: Lectures, seminars
PREREQUISITE: ERTH 3440.03 PHYC 1100X/Y.06 or PHYC 1300X/Y.06, MATH 1000.03 and MATH 1010.03
CROSS-LISTING: ERTH 4450.03, GEOG 4450.03

ERTH 5502.03: Micropaleontology and Global Change.

This class provides a systematic study of major groups of microfossils (principally foraminifera, ostracoda and calcareous nanoplankton). Particular emphasis is placed on the distribution and ecology of recent microfossils, and on laboratory techniques for sampling and studying them. Quaternary paleo-oceanography and faunal distribution is examined based on knowledge of the tolerances of the living organisms.
INSTRUCTOR(S): D.B. Scott
FORMAT: Lecture 3 hours, lab 3 hours

ERTH 5520.03: GIS Applications to Environmental and Geological Sciences.

Geographic information systems (GIS) provide a rich set of new tools to the geologist and environmental scientist, not only to solve conventional problems, but also to explore questions not readily answered by other means. This class builds on the fundamentals of GIS taught in ERTH 3500.03 to explore analytical tools that aid in decision-making processes encountered in mineral exploration, hydrogeology, site selection, environmental assessment, and global change analysis. The class concentrates on case studies and problem solving, including those requiring multi-criteria and multi-objective decision making processes.
INSTRUCTOR(S): C. Walls
FORMAT: Lecture 3 hours, lab 3 hours
PREREQUISITE: ERTH 3500.03 or SCIE 3600X/Y.06, STAT 1060.03, or permission of Instructor

ERTH 5530.03: Environmental Remote Sensing.

This class introduces remote-sensing techniques that provide environmental and geoscience information. The potential and limitations of remotely sensed data are stressed. Lectures discuss the fundamentals with an emphasis on multi-spectral satellite systems. Laboratory exercises include digital image enhancement and thematic information extraction on optical, radar, and hyperspectral data. Remote-sensing information and GIS techniques are integrated throughout the course.
INSTRUCTOR(S): C. Walls
FORMAT: Lecture 3 hours, lab 3 hours
PREREQUISITE: ERTH 3500.03 OR ERTH 5600.03 OR SCIE 3600.03
CROSS-LISTING: ERTH 4530.03

ERTH 5600.03: Exploring Geographic Information Systems.

Geographic Information Systems (GIS), as a tool for the management of georeferenced data, have become indispensable for disciplines where location of objects and pattern of processes is important. GIS plays a significant role in a wide range of applications, from modeling, to analysis and predictions, to decision making. The class is aimed at a broad base of potential users and draws on examples of the role of GIS in global climate change, mineral exploration, preservation of biodiversity, coastal zone management, resource depletion, and many other present and future environmental issues. The course material will be of interest to those studying geoscience, environmental science, ecology, marine biology, oceanography, epidemiology, urban and rural planning, civil engineering, and any other field involving spatial data. Students are expected to complete and present a GIS project related to their field of research. Laboratory exercises emphasize the principles of raster and vector GIS, and the integration of databases and GPS (global positioning systems) data into GIS. Exercises draw on the diversity of GIS applications in a number of application areas..
INSTRUCTOR(S): C. Walls
FORMAT: Lecture 3 hours, lab 3 hours
CROSS-LISTING: ERTH 3500.03, GEOG 3500.03
EXCLUSION: Credit will only be given for one of the ERTH 3500.03, ERTH 5600.03, GEOG 3500.03 OR SCIE 3600.03

Economics

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Osberg, L.

Faculty Advisors
Lesser, B., Graduate Coordinator (494-2026)

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Sinclair, A.M., BA (Dal), MA, BPhil (Oxon), PhD (Harvard)

Professors
Burton, P., BSc (Sask), MA, PhD (UBC)
Dasgupta, S., BA (Calcutta), MA (Delhi), PhD (Rochester)
Iscan, T.B., BA (METU), MA, PhD (Cornell)
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Bradfield, F.M., BComm (McMaster), PhD (Brown)
Cornwall, J.L., BA (Iowa), MSc (London), PhD (Harvard), Dalhousie (Professor Emeritus)
Cornwall, W., BA (MSVU), PhD (Dal), Mount St. Vincent University
Dar, A., BA, MA (Delhi), MA, PhD (McMaster), Saint Mary's University
Dayton-Johnson, J., BA, PhD (Berkeley)
George, R., BSc (London), MSc (Bristol), PhD (London) (retired)
Hoddinott, J., MA (York), MA, DPhil (Oxon)
Huber, P.B., BA, MA, PhD (Yale)(retired)
MacDonald, M., BA (Dal), PhD (Boston College), Saint Mary's University
Marfels, C., Diplom-Volkswirt, Dr Rer Pol (Berlin)
McAllister, R.I., MA (Oxon), MA (Cantab)
Novkovic, S., BA (Novi Sad, Yugoslavia), MA (Guelph), PhD (McGill), Saint Mary's University
Rankaduwa, W., BA, MSc (Sri Lanka), MA, PhD (Dal), UPEI
Raymond, M., BA, MA (Windsor), PhD (Guelph), Saint Mary's University
Rogers, S., BA (Hons) (Kings/Dalhousie), MA (Queen's), PhD (McGill)
Sinclair, A.M., BA (Dal), MA, BPhil (Oxon), PhD (Harvard)(Professor Emeritus)

I. Degree Options

A. Master of Arts

1. Admission Requirements
Candidates must at a minimum satisfy the general requirements for admission as spelled out in the Faculty of Graduate Studies regulations in this calendar. Entrance to a one-year MA Program requires an Honours BA in Economics (or equivalent) with an average of at least B+ (upper-second class) at Dalhousie standards. Normally this means completion of at least eight classes in Economics beyond the introductory level including classes in Microeconomic and Macroeconomic Theory beyond the intermediate level, Statistics, Econometrics and classes in areas related to some of the fields of specialization that are listed below under Program Choices. Mathematics classes which are equivalent to Dalhousie MATH 1000.03 and 2030.03 are also required.

Students who meet the grade requirements but who do not have an Honors degree in Economics by Dalhousie standards may be considered for a Qualifying Year or a two-year MA.

Applicants must satisfy the English Language proficiency requirements of Dalhousie. For more information, see "English Language Proficiency" under "Admissions Requirements" for the Faculty of Graduate Studies.

2. Program Choices
The department offers the MA in the following areas of specialization:
- Microeconomic Theory
- Macroeconomic Theory
- Econometrics
- Labour Economics and Social Policy
- Public Finance
- Resource Economics
- Monetary Theory
- Industrial Organization
- Regional and Development Economics

Department approval is required for the program of each student.

3. Completion of MA Program
Students must successfully complete the required and optional classes of their program. Normally a course of study includes:
- ECON 5500.03: Macroeconomic Theory
- ECON 5509.03: Microeconomic Theory
- ECON 5575.03/5576.03: Applied Econometrics I/Applied Econometrics II
- 4 half credit electives in applied fields of economics
- An essay which may be built on a term paper originally written in one of the graduate field courses in economics but must demonstrate substantial differences and improvements over the original paper. Papers will be evaluated by two faculty readers drawn from the Department.

Normally ECON 5500, 5509 and 5575 are taken in the fall term, ECON 5576 and the 4 electives are taken in the winter term, and the essay is written in the summer.

On approval of the Graduate Coordinator, students also have the option of replacing 2 half credit electives and the essay requirement with a thesis that is submitted to and approved by the Department. The thesis must consist of innovative original work of publishable quality.

B. Master of Development Economics (MDE)

1. Admission Requirements
The normal duration of the program is two years. All candidates for admission must satisfy the general requirements for admission to the Faculty of Graduate Studies. The Department will consider applications for the two-year program from candidates possessing an undergraduate degree with an academic average of at least B+ (upper second-class) at Dalhousie standards. Because of the interdisciplinary nature of the MDE,

applicants may possess a BA, BSc or BComm degree, but all candidates must have at least two classes in Economics beyond the introductory level, including, preferably, intermediate economic theory, plus a basic class in statistics and university level mathematics.

Applicants must satisfy the English Language Proficiency requirements of Dalhousie. For more information, see "English Language Proficiency" under "Admissions Requirements" for the Faculty of Graduate Studies.

2. MDE Program Requirements

The Department of Economics hosts this innovative program of graduate studies in social and economic development, providing a choice of emphasis on either Canadian or international development studies. The program is primarily designed for students and young professionals pursuing, or intending to embark on, careers in government, educational and professional institutions, private corporations or non-governmental organizations. The aim is for an 'individualized program', not 'mass production'. Effective development policy and project design and management requires insights from many vantage points and, while development economics is at the core of this program, inputs from other disciplines make important contributions.

The normal duration of the program is two years. A two year program normally comprises six full credits of course work, of which four will usually be in graduate level economics and two from other disciplines (e.g. biology, environmental studies, political science, public administration, sociology and social anthropology, law, health studies, computer science, business administration).

NOTE: Students in the two-year program who do not have a 2000-level statistics course (by Dalhousie standards) and an introductory econometrics course at the undergraduate level will be required to complete these as part of their program in addition to the six full credits above.

A thesis is also required - representing an opportunity to develop a 'professional portfolio' that demonstrates the ideas and research skills a student has developed in the course of the program.

3. Completion of MDE Program

Students in a full two-year program must normally complete six full-credit classes (plus undergraduate classes in statistics and econometrics where required) plus a thesis.

C. Doctor of Philosophy (PhD)

1. Admission Requirements

Entrance to the PhD program normally requires completion of course requirements for an MA in Economics with an average of at least A- at Dalhousie standards. Students normally prepare for their PhD Comprehensive Exams in two years.

Applicants must satisfy the English Language proficiency requirements of Dalhousie. For more information, see "English Language Proficiency" under "Admissions Requirements" for the Faculty of Graduate Studies.

2. PhD Program Requirements

The PhD program is designed to provide students with a strong foundation in economic theory and quantitative methods and intensive work in applied fields of economics. A course of study recommended for the three-year PhD program would include:

Year 1
- ECON 5500 (Macroeconomic theory)
- ECON 5509 (Microeconomic theory)
- ECON 5575/5576 (Applied statistics and econometrics)
- Two elective classes

Year 2
- ECON 6600 (Macroeconomic theory)
- ECON 6609 (Microeconomic theory)
- ECON 6534/6535 (Econometrics)
- Two elective classes
- One directed reading course

Year 3
- Thesis work

Students can request from the graduate coordinator a waiver for a class. A waiver shall only be granted if the student can demonstrate that the courses taken elsewhere were at an appropriate level. Departmental approval is required for the program of each student.

At the completion of their class work, candidates for the PhD program will be examined in:
- Macroeconomic and microeconomic theory (at the level of Dalhousie Economics classes 5500, 5509, 6600 and 6609)
- Two fields of specialization

Fields of specialization for the PhD are open, subject to the following requirements:
- Applicants to the PhD must clearly indicate on their application the primary field in which they wish to specialize.
- A faculty member in the Department must agree to be the research supervisor for the student before the student is accepted to the program.
- Changes to the student's intended field of specialization after starting the program will also be subject to the agreement of a faculty member in the Department to supervise the student's research in the proposed area of specialization.

3. Completion of PhD Program

Comprehensive examinations consisting of written papers in economic theory and two fields, and an oral examination in the same three subjects, are required at the end of the required period of class work. Starting from the second year of class work, and on an annual basis, the students are required to present their research results at a department workshop.

A suitable thesis must be submitted and defended. Students are required to make a public presentation of a thesis proposal no later than six months after completion of the comprehensives and preferably at some point prior to the comprehensives.

II. Class Descriptions

Classes other than those listed may be offered. Not all classes listed are necessarily offered in any given year. Students should consult the graduate timetable for information on classes offered in a given year.

ECON 5000.03: MDE Microeconomic Theory.

This class provides an intensive overview of microeconomic analysis as background for the analysis of economic and regional development. The Course reviews the core components of microeconomic models (constrained optimization, comparative statics, general equilibrium, and welfare analysis). The course explores the theory of market failures and the consequences when markets are not perfect, particularly looking at risk, uncertainty and strategic interaction between actors (game theory). The course will apply microeconomic theory to development problems, using selected readings to highlight theory and applications.
FORMAT: Lecture 3 hours
PREREQUISITE: ECON 2200.03 or ECON 2210.03, and ECON 2201.03

ECON 5001.03: MDE Macroeconomic Theory.

The purpose of this class is to discuss a range of macroeconomic theories as a way to understand contemporary issues in international economics. The class provides a formal exposition of theoretical models in open economy macroeconomics. The topics covered include intertemporal consumption-saving decisions, economic growth, fiscal and monetary policies, and exchange rate models. Building on these theories, we will compare the growth performances of Asia, Africa, and Latin America, discuss foreign debt and banking crises, and examine the causes and consequences of currency crises.
FORMAT: Lecture 3 hours
PREREQUISITE: ECON 2200.03 or ECON 2210.03 and ECON 2201.03

ECON 5231.03: Health Economics.

This class provides an in-depth survey of Health Economics drawing from international experiences in both developing and developed countries. The class will use economic theory and methods to understand the

functioning of public and private health systems, and evaluating programs (e.g., cost-effectiveness). Students will be assessed by essay and exam.
FORMAT: Lecture

ECON 5251.03: Seminar in Development Studies.

This class is required for MDE students in their final year of study. It is intended to serve as an integrating vehicle for the program. Thus the emphasis of the class is not so much on introducing new material as providing a forum for discussion of previously learned lessons in a shared context, hopefully leading towards a synthesizing of these various learning experiences in the field of development studies. Emphasis is placed on both Canadian regional development and international development issues, in keeping with the two streams of the program. A secondary objective of the class is to help students in the selection of a thesis topic and/or in making progress on their actual thesis work. To these ends, students are encouraged to do their major writing assignments for the class in areas relevant to or part of their thesis work.
FORMAT: Seminar 2 hours

ECON 5252.03: From Disaster Relief to Development.

This class introduces students to the growing literature built around comparative experiences of disaster prevention, mitigation, relief and sustainable development. Analytical frameworks for better understanding the reasons behind a cross-section of complex disasters are explored. Ways to improve development planning at both project and broader policy levels are examined. Main themes include food and clean water, (security, distribution, drought reduction); refugees, asylum seekers and settlements for sustainable development; early warning systems for hurricanes, volcanoes and famines - their integration into national development planning; emergency programming in the context of military, political and economic instability; issues of humanitarian law and peacekeeping. Case studies are routinely tested in cooperation with UN Departments, the International Red Cross, and the Pearson Peacekeeping Training Centre, as a part of the class's applied orientation. Internship experiences are facilitated as an extension of this class.
FORMAT: Seminar 2 ½ hours

ECON 5253.03: Development Economics I.

Economics 5253 is one of the core courses of the Master of Development Economics (MDE) degree. It provides an introduction to key conceptual and measurement issues in development and gives an overview of some selected macroeconomic issues, in particular the macroecomic policy environment for development. The focus of this course is on "macro" topics and hence it complements Economics 5254, which deals with "micro" topics. The course will be taught using a combination of lectures and small-group work.
FORMAT: Lectures and Seminars

ECON 5254.03: Development Economics II.

This course is one of the core courses of the Master of Development Economics (MDE) degree. It focuses on the theory and evidence of economic development, and from these draws out implications for policy and practice. Econ 5254 complements Econ 5253 with an examination of microeconomics issues including, the role of institutions, household behaviour and gender, the functioning of markets, health, education, evaluation, and the use of common property resources and policies for sustainable development. The course will be taught using a combination of lectures and small-group work.
FORMAT: Lectures and Seminars

ECON 5330.03: International Trade.

This class examines the theory and empirics of international trade. It covers the standard trade theory of Ricardo, Heckscher, and Ohlin, as well as the more recent theory of scale economies, and discusses empirical testing of these theories. The class goes on to investigate the welfare effects of trade policies in industrial and developing countries and the institutions that have developed to regulate those policies. Finally, the class considers the relationship between trade and growth.
FORMAT: Lecture 2 1/2 hours

ECON 5333.03: Theories of Economic Development.

This class focuses on the application of economic theory to issues in economic development at the micro and macro level. After reviewing concepts of development, topics to be covered will include: intrahousehold allocation; the functioning of labor and credit markets (with applications to child labor and microcredit); use of common property resources; growth and distribution; development and globalization.
FORMAT: Lecture 2 ½ hours

ECON 5334.03: Economic Development. Recent Debates, Controversies and Conflicts.

This class focuses on current areas of debate among researchers, policy-makers and civil society, related to international development issues. As such, the topics to be covered will vary substantially each time the course is offered. In general, course materials will include both academic sources as well as more polemical material, depending on the debates in question. Students can expect a high level of participation in presenting material and discussing issues, in addition to preparing a term paper.
FORMAT: Seminar 2 1/2 hours

ECON 5350.03: Project Evaluation and Social Cost Benefit Analysis.

FORMAT: Lecture

ECON 5431.03: International Finance.

This class covers the theory and empirics of international macroeconomics. It examines balance of payments accounting; the effect on exchange rates of trade flows, capital flows, speculation, and risk; the effectiveness of fiscal and monetary policy in an open economy; modern international policy coordination; and the determination of the trade balance and the balance of payments.
FORMAT: Lecture 2 1/2 hours
PREREQUISITE: ECON 3338.03 and either ECON 5000.03 OR 5500.03

ECON 5500.03: Macroeconomics.

This class is an introduction to the contemporary issues in dynamic macroeconomics. The class will survey some of the classical and recent topics excluding monetary issues which are addressed in ECON 5502.03. The topics covered include intertemporal consumption and saving decisions under uncertainty, capital asset pricing models, theory of investment under uncertainty, Solow growth model, endogenous economic growth, alternative explanations of business cycles, and financial market imperfections.
FORMAT: Seminar 3 hours

ECON 5502.03: Monetary Theory: Microeconomic Aspects.

This class focuses on the financial behavior of four agents: (a) the central bank, i.e. The Bank of Canada, (b) commercial banks, (c) nonbank financial intermediaries, (d) the household and firm. Four important issues will be discussed: (1) the kinds of financial assets created in a modern economy; (2) the way in which money and credit are supplied in the modern economy, particularly the operations of the central bank and of financial intermediaries which enable these institutions to expand and/or contract the quantity of money and credit; (3) the behavior of the economic agents who demand and supply financial assets; and (4) the framework in which monetary policy can be analyzed.
PREREQUISITE: ECON 3338.03, 3326.03 and 4426.03 and either ECON 5001.03 or ECON 5500.03

ECON 5503.03: Public Finance I.

This class deals with the economics of the public sector with major emphasis on the allocative and distributional effects of government policy. The first half of the class examines government spending under the headings of the welfare foundations of public finance, public goods and externalities. Particular attention is paid to how we might assess the distributional implications of government spending programs. How might we measure poverty or inequality? How should we make interpersonal comparisons?
FORMAT: Lecture 3 hours

ECON 5509.03: Microeconomic Theory.

This class in microeconomic theory is required in the MA program. Subjects covered include: 1) theory of the firm (technology, cost, profit, maximization, introduction to linear programming, duality, supply); 2) theory of the consumer (utility, expected utility, revealed preferences, demand, integrability); 3) general equilibrium (existence, uniqueness, stability) and welfare economics (classical theorems); 4) theory of the market (pure monopoly, oligopoly, monopolistic competition, game theory).
FORMAT: Lecture 3 hours

ECON 5513.03: Regional Economics: Analyses and Policies.

This class analyzes various theories used to explain regional growth and disparities. This involves examining the assumptions, the strengths and weaknesses, and the implications of each theory. Emphasis is on the impact of market imperfections on regional performance. The discussion includes the application of the theories to actual situations, usually Canadian. Policy discussions focus on capital and labor markets, technological change, and market structures.
FORMAT: Lecture 3 hours

ECON 5514.03: Monetary Economics: Macroeconomic Aspects.

ECON 5514.03 is a natural continuation of ECON 5502.03. The main concern of this class is the multimarket equilibrium with money and credit. The class will pay attention to the transmission mechanism, i.e., the way in which changes in the quantity of money and credit exert effects upon the activity of the economy as a whole. There are two transmission mechanisms which fundamentally differ: 1) a neoclassical transmission mechanism that in our days goes under the analytically adjusted mantle of Monetarism and the new classical economics; 2) the Keynesian transmission mechanism.
PREREQUISITE: ECON 3338.03, 3326.03 and 4426.03 and either ECON 5001.03 or ECON 5500.03

ECON 5516.03: Resource and Environmental Economics I (Resources).

This class is designed as an introduction to the theory and application of resource economics. Topics include: 1) interpersonal and intertemporal decision-making criteria; 2) the basic theory of nonrenewable resource exploitation (including Hotelling's theory of the mine); 3) a basic forestry model (i.e., the Faustmann model) including extensions which allow for benefits that arise from standing forests; and 4) the Gordon-Schaefer model of the fishery and optimal dynamic harvesting. Empirical applications of these models (from the current economic literature) will also be presented.
FORMAT: Lecture 3 hours
PREREQUISITE: Students must be very comfortable with calculus

ECON 5517.03: Resource and Environmental Economics II (The Environment).

This class is designed as an introduction to the theory and application of environmental economics. It includes the theoretical analysis of 1) interpersonal and intertemporal decision-making criteria; 2) public goods and externalities (such as pollution) and the advantages/disadvantages of regulatory mechanisms; 3) valuation of environmental benefits or damages (e.g., compensating and equivalent variations); 4) preference revelation (e.g., surveys, hedonic pricing, and travel-cost methods); and 5) anthropocentric valuation of the environment (e.g., existence value, access value, option value and quasi-option value) and the possibility of nonanthropocentric decision making. Empirical analyses will be discussed where the above approaches have been implemented.
FORMAT: Lecture 3 hours
PREREQUISITE: Students must be very comfortable with calculus

ECON 5518.03: Antitrust Economics.

What do you get when you cross the world's biggest phone company with the biggest cable company and the biggest software company. The corporate octopus in question is AT&T which recently acquired cable company Media One and which entered into a strategic alliance with Microsoft. The irony is that AT&T was broken up in 1984 because of its dominance of local and long-distance phone markets in the U.S. Well, it has come back with a vengeance.
Welcome to the new era of global deal making. Not a day goes by without a giant merger, Daimler-Benz and Chrysler, Weyerhaeuser and MacMillan Bloedel, the list goes on and on. What does this all mean for U.S. Antitrust and Canadian competition policy? To what extent can and should antitrust/competition policy interfere at the domestic base of multinational corporations? Should it be just domestic or should international "cooperative" activity be included? The class will deal with existing antitrust laws and their administration in the contemporary environment.
FORMAT: Lecture 3 hours

ECON 5520.03: Economic Applications of Game Theory.

Game theory and information theory are now used in most aspects of economic analysis and a proper understanding of these approaches has become a necessary condition for accessing much of the current literature. The class includes the study of Static/dynamic games of complete information, Static/dynamic games of incomplete information, moral hazard, adverse selection and mechanism design.
FORMAT: Lecture 3 hours
PREREQUISITE: ECON 5509.03, 5521.03 or permission of instructor

ECON 5521.03: Mathematics for Economics.

This class is designed to provide the required preparation in mathematics for the study of graduate economic theory. Topics to be covered include linear algebra , analysis, convex sets and functions, constrained optimization, as well as special topics in mathematics and economic theory.
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 1000.03, MATH 2030.03, or permission of instructor

ECON 5522.03: Labor Economics I.

This class provides an survey of modern Labor Economics, focusing on labor supply, human capital theory, structural change in labor markets, trends in poverty and earnings inequality and the policy responses of the 'Welfare State'. Discussion is based on recent journal articles. Students are graded on the basis of essays and a final exam.
FORMAT: Lecture 3 hours

ECON 5524.03: Social Policy: Economic Issues and Perspectives.

This course provides an overview of social policy analysis in economics and an in-depth examination of selected topics (for example income security policy, poverty alleviation and income redistribution, health policy and health determinants from both a systemic "macro" perspective and a "micro" program evaluation point of view. The focus is on Canadian policy in comparative perspectives.
FORMAT: Lecture

ECON 5534.03: Econometrics.

In this class the single equation models-specification, parametric estimation, and inferential procedures - will be discussed. Emphasis is placed on formal proving of various propositions concerning the properties of estimators of those models. The topics covered will include the theory of least squares estimator, generalized least squares estimator, and the maximum likelihood estimator.
FORMAT: Lecture 3 hours
PREREQUISITE: One semester class in mathematical statistics which includes distribution theory and statistical inference, one semester class in linear algebra, and one semester class in introductory econometrics

ECON 5535.03: Econometrics II.

In this class multi-equation models - specification, parametric estimation, and inferential procedures - will be discussed. Emphases are placed on the formal derivations of suitable estimators, their properties, and tests of hypotheses. Asymptotic distribution theory and its use in applied econometrics will be discussed in detail.
FORMAT: Lecture 3 hours
PREREQUISITE: ECON 5534.03

ECON 5575.03: Applied Econometrics I.

This class is designed to introduce the student to the practical problems encountered in estimating econometric models. Violations of the assumptions of the classical linear model are frequently found in economic data. Procedures for estimation and forecasting under these conditions (heteroscedasticity, autocorrelation, multicollinearity) are discussed. An important aim of this class is to give the student a working knowledge of estimation techniques commonly used by economists.
FORMAT: Lecture 3 hours
PREREQUISITE: ECON 2280.03 (or STAT 2080.03) and intermediate economic theory classes

ECON 5576.03: Applied Econometrics II.

This class builds on the material learned in ECON 5575.03. Its primary objective is to extend the student's capabilities to conduct quantitative research in Economics, and to examine critically the results of such work. The topics include problems of specification and measurement and some special models such as distributed lag models, autoregressive models, limited dependent variable models, simultaneous-equation models and time series models.
FORMAT: Lecture 3 hours
PREREQUISITE: ECON 5575.03

ECON 5601.03: Special Topics in Macroeconomics.

ECON 5659.03: Special Topics in Labor Economics.

ECON 5670.03: Special Topics in Econometrics.

ECON 6534.03: Econometrics I.

This is an econometrics course for PhD students. It reviews introductory mathematical statistics including parameter estimation (GLS, ML, GMM), hypothesis testing, and asymptotic theory. The parametric and nonparametric models including linear, nonlinear, limited dependent variable, and simultaneous equation models are explored in the context of cross-sectional time series and panel data.
FORMAT: Lecture
PREREQUISITE: ECON 5575, ECON 5576

ECON 6535.03: Econometrics II.

This course is an introduction to stationary and nonstationary time series in econometrics. The topics covered are: estimation and hypothesis testing for stationary time series models, theoretical foundations for nonstationary times series models, unit root tests, cointegration, tests for cointegration, estimation of cointegrated systems and vector autoregressive models with some unit roots.
FORMAT: Lecture
PREREQUISITE: ECON 6534

ECON 6600.03: Macroeconomics II.

The purpose of this class is to understand the structure of the major theoretical frameworks in contemporary macroeconomics. The class addresses issues that mainly relate to the real side of the macroeconomy. Major emphasis is placed on neoclassical and endogenous economic growth, overlapping generations models and public debt, and macroeconomic implications of nominal rigidities, monopolistic competition, and heterogeneity.
FORMAT: Seminar 3 hours

ECON 6609.03: Microeconomic Theory II.

This class in microeconomic theory is required in the general PhD program. Its list of subjects includes: 1) General Equilibrium (existence, determinateness, stability) and Welfare Economics (classical theorems); 2) special topics in General Equilibrium Theory (intertemporal economies, equilibrium over time, uncertainty, temporary equilibrium, theory of the core and other solution concepts); 3) special topics in Welfare Economics (public goods, externalities, consumer surplus, fair allocations); 4) economics of information (signals and prices, moral hazard, equilibrium configurations).
FORMAT: Seminar 3 hours

ECON 9000.00: MA Thesis.

ECON 9001.00: Graduate Essay in Economics.

Students who pursue the "course plus essay" option for the MA program must register in this course, and complete a research paper (essay) of between 7,500 and 12,500 words. This essay may build on a term paper originally written in one of the graduate field courses in economics taken by the student but, in this case, must demonstrate substantial differences and improvements over the original paper.

ECON 9530.00: PhD Thesis.

Special Topics classes, not separately listed, will be arranged to provide for advanced work in the areas of specialization chosen by PhD students. MA students with the appropriate backgrounds will also be admissible to such classes. Other classes than those listed may also be offered and certain of the classes listed are not necessarily offered on an annual basis.

Electrical and Computer Engineering

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Department Head

El-Masry, E.I., BEng, MSc (Alexandria), PhD (Man), PEng. Low-voltage and low-power analog and mixed-signal integrated circuits (IC's) for audio frequency, IF and RF applications.

Professor Emeritus

Marble, A.E., BEng, MASc, PhD (TUNS), PEng.

Professors

Cada, M., Dipl. Ing., MSc, PhD (Prague), PEng. Graduate Coordinator. Photonics, optical switching, quantum well devices, nonlinear photonics, multilayer and periodic structures, optical computing, optical image processing, photonic crystals.

Chen, Z., BEng (Fuzhou), MSc (Southeast), PhD (Ottawa), PEng Electromagnetic modelling and simulation, RF/microwave electronics, antennas, wireless communications and technology.

El-Hawary, M.E., BEng (Alexandria), PhD (Alta), PEng. Power systems, environmental and underwater signal applications. Modelling and optimization of dynamic systems, environmental impacts and underwater activities. System and computer applications in power system planning and operations.

Gregson, P.H., BEng, MEng, PhD (TUNS), PEng. NSERC Chair in Design Engineering. Developing theory, algorithms and architecture for real time vision using analog VLSI. Automated detection and quantification algorithms for medical and industrial imaging. Design methodology.

Hughes, F.L., BSc (Carleton), MSc, PhD (Newcastle upon Tyne). Energy security, climate change, renewable energy, embedded systems, and protocol design.

Leon, L.J., BSc, MSc, PhD (Dal), PEng. Computational Electromagnetics, parallel and distributed computing, biomedical engineering, cardiac electrophysiology.

Associate Professors

Gu, J., BSc (USTC China), MSc (SJTU, Shanghai), PhD (Alberta), PEng. Robotics, biomedical engineering, control systems, intelligent systems.

Ilow, J., BEng (Wroclaw, Poland), MASc, PhD (Toronto). Statistical communication theory and wireless networks.

Little, T.A., BScEng (UNB), MEng (Memorial), PhD (UNB), PEng. Alternate energy generation, electric machines, energy storage systems.

Assistant Professors

El-Sankary, K., BEng (Lebanese U), MSc (U of Quebec), PhD (U of Montreal). Integrated analog and mixed-signal circuits and systems in CMOS technologies for telecommunication and biomedical application.

Gonzalez-Cueto, J., BEng, MScE (LasVillas Cuba), PhD (UNB). Design and implementation of signal processing techniques and application to biological signals.

Ma, Y., BSc, MEng (Southeast), MSC, PhD (Alberta). Micro-Electro-Mechanical Systems (MEMS), CMOS/BiCMOS integrated MEMS and Optical MEMS.

Ponomarenko, S., Dipl, Phyc (Russia), PhD (U of Rochester). Nonlinear optics and photonics; optical solitons in fibers, nonlinear waveguides and amplifiers; matter wave solitons in trapped Bose-Einstein condensates; free space optical communications; foundations of statistical physics and statistical optics; resonant light-matter interactions.

Part-time Professor

Nugent, S.T., BEng (TUNS), MASc (Toronto), PhD (UNB), PEng. DSP of physiological signals, image processing.

Cross Appointment

Hill, I., (from Faculty of Science, Physics), BSc, PhD (Queen's)

Adjunct Associate Professors

Sivakumar, S., BSc (U of Madras), BEng (Ind. Inst. of Science), MASC (UNB), PhD (UNB), PEng

Vallee, R., MEng (Carleton), PhD (TUNS)

Adjunct Assistant Professors

Isenor, G., BSc (Dal), BEng (TUNS), MASc (TUNS), PhD (Dal), PEng

Nie, H., PEng., MEng (Tsinghua), PhD (UBC)

I. Introduction

Of all the various disciplines, perhaps no other branch of engineering can claim to have such an impact on modern society as Electrical and Computer Engineering. The ease, speed and precision by which electrical energy and electrical signals can be transmitted, transformed and controlled has enhanced the quality of people's life. Over the short span of only a few decades, Electrical and Computer Engineering has grown from a study of abstract phenomena to a multi-branch discipline with significant applications in the areas of power systems, communication systems, control systems, computers and electronics. This rapid growth, coupled with major advances in technology and material science, has made the field a very dynamic one, and poses a challenge to the student, to the educator and to the practicing Electrical and Computer Engineer. See the Engineering section for details of Masters and Doctoral programs.

II. Class Descriptions

ECED 6070.03: Modern Integrated Filters.

This class deals with the design and implementation of modern analog integrated filters. It covers the following topics: fundamentals of continuous-time and sampled-data active filters, behavioral modeling and design of operational and transconductance (Gm) amplifiers, Gm-C filters, advanced design techniques for switched-capacitor filters (including multiple-loop feedback structures), current convoyer's techniques, current-mode filters (switched-current filters and log-domain filters), low-voltage and low-power filters design techniques for applications in portable as well as wireless communication systems.

ECED 6130.03: Advanced Topics in Power Systems.

Basic concepts. Review of optimization techniques. Linear and non-linear programming. Pontryagin's maximum principle. Fletcher-Powell method, etc. Systems security monitoring. State estimation. Optimal power flow. Real and reactive power optimization. On-line optimization. Load dispatching. Generator scheduling, maintenance scheduling in hydro, thermal and hydrothermal systems. Some case studies.

ECED 6150.03: Power System Operation and Control.

The hierarchy of controls in interconnected systems; station, area and tie-line controls. Economics and security related factors. Implementation of overall automatic control. Protective systems; relay schemes.

ECED 6221.03: Analog MOS Design.

The class deals with providing a detailed description of the MOS (Metal-oxide-semiconductor) transistor in conjunction with analog MOS circuitry. Major topics that will be covered are: introduction to semiconductor physics, pn junctions, MOS capacitors, DC and AC characteristics of MOSFET, analysis of analog MOS elements (current mirrors, amplifiers, and biasing circuitry), noise and RF using MOS transistors will also be addressed.
PREREQUISITE: IC Design or by permission of instructor.

ECED 6260.03: Computer Vision.

The class will discuss early vision processing including image formation, early processing, edge detection, range determination, determination of surface orientation, optical flow, resolution pyramids for grey-level

segmentation, and context dependent edge detection. Scene segmentation, edgel aggregation, the Hough transform, edge following, contour following, region growing and split-and-merge algorithms will be discussed. Motion determination will be covered, including optical flow, motion-based surface orientation and motion-based edge detection, and motion-based segmentation.

ECED 6265.03: Advanced Computer Vision and Image Processing.

The class will cover modern techniques in computer vision and image processing, including but not limited to statistical pattern recognition, determination of pose from multiple views, velocity-based scene segmentation, determination of depth from monocular views and both space- and time-diversity stereo, uni-modal and multi-modal image registration, feature detection using feature-space clustering, and segmentation and recognition by invariants. Students will be required to prepare papers for presentation in a weekly seminar. This class will meet once weekly for 3 hours. Enrollment is restricted to 7 students.

ECED 6324.03: RF/Microwave System Design for Telecommunications.

The class provides essential design techniques for radio/microwave links in telecommunication systems. Major topics include: review of general radio propagation in free space, over obstacles and in the Earth's atmosphere; the design principles of broadband radio/microwave communication links; design and sizing of satellite earth stations; development of hardware configurations for line-of-sight radio links. PREREQUISITE: Permission of the instructor.

ECED 6330.03: Computational Electromagnetics.

This class introduces the theory and applications of numerical techniques employed to solve various electromagnetic structure problems in both time and frequency-domains. Major topics include: review of electromagnetic theory, variational approach, finite-difference time-domain (FDTD) method, transmission line matrix (TLM) method, finite element method (FEM), method of moment (MoM), method of line (MoL) and boundary element method (BEM). Projects include applications of different computational techniques to solve electromagnetic problems.

ECED 6355.03: Laser Optics.

This class begins with a review of quantum mechanics relevant to the development of the laser principle. This approach is used along with the pertinent electromagnetic theory to examine the issues that lead to laser oscillation. Topics discussed include: electromagnetic modes, propagation of rays and optical beams, optical resonators, interaction of radiation and atomic systems, theory of laser oscillations, some specific laser systems, semiconductor lasers, and second-harmonic generation.

ECED 6360.03: Fiber and Integrated Optics.

This class introduces the principles and devices of photonics. Major topics include: optical waveguides and fibers, light sources, modulation and detection techniques, optical wavelength functionalities, fiber-optic communications, integrated optics and sensors, various applications.

ECED 6530.03: Random Processes.

Probability theory: mathematical model, conditional probabilities, random variables, pdf, transformation of random variables, conditional densities, statistical averages. Random processes concept; ensemble, stationarity, ergodicity, correlation and covariance, power spectral density, calculation and measurement of ACF, AVF and PSD, Gaussian random processes, noise. Transmission of random processes through linear systems: time-invariant systems, multiple terminals, Gaussian processes, non-stationary processes.

ECED 6550.03: Digital Signal Processing.

The class provides an introductory treatment of the theory and principles of digital signal processing, with suitable supporting work in linear system concepts and digital filter design. More specifically, the class deals with the following topics: General concepts of digital signal processing, continuous-time system analysis, Fourier analysis and sampled-data signals, discrete-time system analysis, realization and frequency response of, discrete-time systems, infinite impulse response digital filter design, discrete and fast Fourier transforms, and general properties of the discrete Fourier transform.

ECED 6560.03: Data Communications.

This class provides a structured introduction to data communications through an examination of existing and proposed data link and network layer protocols. Topics include a brief history of data communications, protocol design for reliable communications, addressing (unicast, multicast, broadcast, and anycast), routing algorithm design, Internet protocols, and IPv6.

ECED 6585.03: Telecommunications Systems.

This class provides an overview of the current telecommunication systems and their future evolution. Topics will include: the history of the telephone network, the current infrastructure, switching techniques, high speed transport systems Asynchronous Transfer Mode, satellite communications, high bandwidth access technologies, mobile cellular systems, personal communication systems.

ECED 6590.03: Mobile Communication Systems.

This class provides an overview of mobile communications systems. The class introduces channel characterization for propagation losses, fading, delay spread, and interference. Coding, modulation, and receiver design issues are examined. Cellular mobile system issues such as frequency planning channel access methods and handoff are discussed. Mobile communication system applications are reviewed.

ECED 6595.03: Coding Techniques for Digital Communications.

Source and channel coding techniques to improve the performance of digital communication systems are examined. The source coding methods to be studied include prediction, block coding, redundancy reduction, and synthesis/analysis coding. Emphasis is placed on channel coding techniques. Waveform coding and error control concepts are covered. Parity check codes, block codes, cyclic codes, convolutional coding and decoding algorithms, concatenated codes and interleaving are studied. Coded modulation techniques are discussed. Applications of coding techniques are presented.
PREREQUISITE: ECED 4503.03, ECED 4504.03 or equivalent

ECED 6620.03: Optimal Control Systems.

This class introduces three facets of optimal control-dynamic programming, Pontryagin's Minimum Principal and numerical techniques for trajectory optimization. In all cases, the objective is to determine the optimal controller or algorithm with respect to a specified design index. Digital simulation techniques are widely utilized.

ECED 6630.03: Introduction to Estimation, Identification and Stochastic Control.

Stochastic processes, Gauss-Markov sequence model, Gauss-Markov process model, optimal estimation for discrete systems, optimal prediction for discrete linear systems, optimal filtering in the presence of time-correlated disturbances and measurement errors, problem formulation and equivalent discrete-time problem.

ECED 6640.03: Mobile Robotics.

This class is an in depth study of algorithms in mobile robotics. Topics include motion planning, localisation, mapping, navigation and sensor fusion. Wheeled and legged mobile robots will be covered and kinematics' models are developed for many of the more common locomotive strategies.

ECED 6650.03: Advanced Topics on Optimization Methods in Engineering and Physics.

Nature and systems considered in engineering and physics have an abundance of examples where an optimum system status is sought. The class aims to provide the students with advanced theory of optimization and topics that arise in applications of the optimization techniques. The challenge of this course is to increase the utilization of the optimization methods by development and use of appropriate algorithms derived for specific problems in engineering and physics. They include those arising in VLSI design, computer engineering, chemical reactor control, in spin

glasses as well as in networking, particularly in networks with frequently changing topology. State-of-the-art of the advanced optimization techniques is presented. Geometric interpretations, time-space decompositions and large- and small-scale considerations are stressed wherever possible.
PREREQUISITE: Permission from instructor
CROSS-LISTING: IDIS 6006.03

ECED 6660.03: Fuzzy Systems.

Fuzzy sets and their membership functions, support and alpha level sets are introduced. Basic set-theoretical operations of intersection and union and the concept of compensation are discussed in the context of the algebraic operations including t-norms and s-norms. Fuzzy measures and the extension principle are discussed as the basis for operations on fuzzy numbers. Fuzzy relations, graphs, extrema, integration, and differention are treated. Decision theory, linear regression, linear programming applications are discussed.

ECED 6810.03: Neural Networks.

The class deals with preliminaries of artificial neural systems including fundamental concepts and models.
Single layer perception classifiers and multi-layer feed forward networks, single-layer feedback networks, and associative memories are covered.
CROSS-LISTING: CSCI 6507.03

ECED 6900.03: Graduate Seminar.

Regular seminars as per the Faculty of Graduate Studies requirement and departmental regulations. See section 5.5 of the Graduate Studies handbook for the Faculty of Engineering as well as Departmental Regulations as provided by the department. Graded pass/fail.

ECED 6910.03: Directed Studies in Electrical and Computer Engineering.

This class is available to graduate students enrolled in a Master's Degree program in Electrical and Computer Engineering, who wish to gain knowledge in a specific area for which no graduate-level classes are offered. Students are assigned an advisor and are required to present a formal report, or take a formal examination, at the end of the class.

ECED 7610.03: Semiconductor Integrated Optoelectronics.

In this class, physical fundamentals and principles of operation of semiconductor photonic devices and integrated structures are introduced. Structures for optical radiation generation and detection, nonlinear and bistable devices, etc., are studied.
Integration of these components onto a common substrate for implementing optoelectronic functions such as modulation, switching, multiplexing, etc., is described.
Applications in fast optical signal processing devices, high-performance optical communications systems, and optical computing are addressed.

ECED 7910.03: Directed Studies in Electrical and Computer Engineering II.

This class is available to graduate students enrolled in a PhD program in Electrical and Computer Engineering who wish to gain knowledge in a specific area for which no graduate-level classes are offered. Students are assigned an advisor and are required to present a formal report, or take a formal examination, at the end of the class.

ECED 9000.00: Master's Thesis.

ECED 9530.00: PhD Thesis.

Electronic Commerce

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Instructors

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Scassa, T., BCL, LLB (McGill), LLM, JSD (Mich.)
Schellinck, D.A., BSc, MBA (Dalhousie), PhD (Illinois)
Silver, D.L., BSc (Acadia), CIM (SMU), MSc, PhD (ABD, Western)
Slonim, J., BSc, MSc (Western), PhD (Kansas)
Srinivas, S., BEng (Bangalore), PhD (Inst. Of Science, Bangalore)
Sullivan, K., BSc, BEd (Dalhousie), MEd, PhD (Alberta)
Trappenberg, T., MSc, PhD (Aachen)
Watters, C.R., BSc, MSc, MLS (Western), PhD (TUNS)
Zincir-Heywood, N., BSc, MSc, PhD (Ege)

I. Introduction

The Faculty of Computer Science, in partnership with the Faculties of Management and Law, offers the degree of Master of Electronic Commerce.

Electronic Commerce is a discipline whose underpinnings lie equally in technology, business, and social and economic policy. Distinct from any of the disciplines that comprise it, this multi-disciplinary two-year program consists of core classes, elective classes, a research project, and an industrial internship. Students study core topics in each of the three areas and can then concentrate on some topics by choosing electives from the Technology, Business, Law and Policy study areas. Visit the Electronic Commerce website at **http://www.ecomm.dal.ca** for a complete program description and for information concerning updates to the program's regulations and class offerings. Email queries can be addressed to mec@cs.dal.ca.

II. Admission Requirements

Students entering this program will usually have completed a four-year bachelor's program or graduate degree in Computer Science, Computer Engineering, Industrial Engineering, Business, Social Science (e.g. Political

Science or Economics), Law, or other related disciplines. All applications are individually evaluated and students from other disciplines may be admitted.

Students must meet normal admission standards for the Faculty of Graduate Studies (for more information visit http://www.dalgrad.cal.ca/admissions).

III. Program Outline

The program for full time students consists of four terms with two terms of lectures and 2 terms of individually supervised research.

Term 1

The program starts regularly each fall, and we offer several specific introductory courses for electronic commerce each fall term. A full time student is expected to take four courses, including an eCommerce overview course (ECMM 6000), usually two of three introductory courses to specific disciplines (ECMM 6010/20/30 corresponding to technology/business/law) which are not in the specialty area of the students, and one elective from computer science, business, or law.

Term 2

The second term is dedicated to more specific studies leading to the specialization of each student. A full course load consists of four courses, the mandatory research methods course (ECMM 6040) and three electives. Elective courses are graduate courses from Business, Computer Science and Law which are relevant for electronic commerce and some special offerings for electronic commerce (ECMM 60XX). These are typically courses from the list of pre-approved elective courses (see below), but it is also possible to take other relevant courses with the permission of the executive committee.

Breadth requirement

It is necessary that the electives chosen by each student cover at least two of the three areas in the program. For example, a student who takes mainly business courses must take at least one elective from computer science or law.

Elective Classes

Candidates may study electives from graduate level classes in the Faculty of Computer Science, School of Business Administration, School of Public Administration, and the Faculty of Law if appropriate for the program and prerequisites are met.

Approved stream classes include the following:

Technology Oriented Classes

- ECMM 6012.03 Electronic Payments and Security
- ECMM 6014.03 Databases and Data Mining for Electronic Commerce
- ECMM 6016.03 Networking for Electronic Commerce
- CSCI 6xxx.03 Graduate computer science elective - prerequisite: Permission of instructor or program coordinator

Business Oriented Classes

- ECMM 6022.03 IT Project Management (recommended)
- ECMM 6024.03 New Venture Creation - prerequisites: permission of instructor
- BUSI 6313.03 Organizational Change
- BUSI 5401.03 Marketing Management
- BUSI 6420.03 Marketing Informatics
- BUSI 6517.03 Managing the Information Resource - prerequisite: permission of instructor
- BUSI 6522.03 Knowledge Discovery and Data Mining - prerequisite: permission of instructor
- BUSI 6516.03 Database Management Systems - prerequisite: BUSI 5511.03 or permission of instructor
- BUSI 6409.03 Internet Marketing
- PUAD 6026.03 e-Government: International Experiences and Perspectives
- PUAD 6500.03 Business and Government
- INFO 6640.03 Electronic Access to Information
- INFO 6540.03 Database Management Systems
- INFO 6370.03 Records Management

Policy Oriented Classes

- LAWS 2019.03 Law and Technology (recommended)
- LAWS 2168.03 Internet and Media Law (recommended)

Further studies in the law specialization may include:

- LAWS 2130.03 International Trade Transactions
- LAWS 2159.03 Advanced Health Law
- LAWS 2183.03 Privacy Law
- LAWS 2178.03 Intellectual Property

Industrial Internship

The internship is a placement within an organization related to electronic commerce, or electronic government. The employer agrees to ensure that the content of the placement is related to electronic commerce. Approval of the placement by the electronic commerce Executive Committee is required. It is ultimately up to the student to secure a placement, however, the Executive Committee makes every effort to have a pool of potential placements available for students. Students must have completed at least three core courses and three elective classes (or have received special permission from the electronic commerce Executive Committee) before starting their internship. The Internship is only required in the Research Paper and Research Project option.

Individually-supervised Research Component

An individually-supervised research component is carried out under the supervision of a specialist in an area in which the student wants to specialize. This further study can be related to the internship, but it is academic in nature (i.e. a business case, a survey, or a computer implementation). A written report is expected upon completion.
There are three program options for the research component of the program:

i. Research Paper + 2 Additional Electives

This program option offers the study of a specific topic beyond the typical coverage in a course and requires a written report that is evaluated by a reader from one of the three Faculties of Computer Science, Management, or Law. No public presentation is required, and it is not expected to generate new data or theories. This option must be augmented with two additional elective courses relevant to the area of specialization. This option also requires an Internship.

ii. Research Project

This program option typically focuses on an implementation of specific solutions or a thorough analysis of a specific topic with a significant contribution, and requires a comprehensive report and a public presentation. Research projects will be conducted and evaluated under standard guidelines of the Faculty of Graduate Studies for masters' level projects, and requires a supervisor (from any institution) and a reader from one of the three Faculties at Dalhousie (Computer Science, Management, Law) who is a member of the Faculty of Graduate Studies. This option requires an Internship.

iii.Thesis

Students considering PhD level studies may, with approval of the electronic commerce Executive Committee, elect to do a thesis instead of a research project. Such a thesis would be conducted and evaluated under standard Faculty of Graduate Studies thesis guidelines. A thesis must make an original research contribution (see FGS thesis guidelines) of considerable scientific, legal, or management interest that would qualify for a publication in a major conference or professional journal. This option requires a public thesis defense. No Internship is required for this option.

IV. Class Descriptions

ECMM 6000.03: Overview of Electronic Commerce.

Electronic commerce deals with the conduct of business using computer and communication technologies. It takes place in an environment shaped by government and business policies as well as social attitudes. The class examines issues in global electronic commerce and an understanding of the impact of the interaction and interdependencies of technology, business, and policy on electronic commerce.

ECMM 6010.03: Technology Issues for Electronic Commerce.

The goal of this class is to examine the technologies and infrastructure required to support electronic commerce. The class examines the major components of the infrastructure including networks, databases and data warehousing, electronic payment, security, and human-computer interfaces.

ECMM 6012.03: Electronic Payments and Security.

Essential for the conduct of electronic commerce are electronic payment systems. Traditional forms of payment are unsuitable for the network medium because of security considerations, inefficiencies, taxation and local laws, or simple inapplicability. This class will cover the various methods of transferring money over the Internet and compare their functionality. The class includes material on electronic cash, electronic checks, electronic credit cards, micro-payments, the encryption and digital signature techniques needed to support electronic cash and the technology available to support secure transactions on the Internet. Implementations of the various payment systems will be examined and compared.

ECMM 6014.03: Databases, Data Warehouses and Data Mining for Electronic Commerce.

Data warehousing and data mining are two emerging technologies which will have a profound effect on the role information plays in organizations. A data warehouse is a repository of data taken from multiple sources that supports querying and analysis tools. Data mining, the process of knowledge discovery from data in a data warehouse, is typically used for strategic planning and has great economic potential for organizations. This class covers key issues in data warehouse architecture, design of data warehouse schemas, design of metadata repositories, the creation, development and maintenance of warehouses, as well as tools and techniques for querying, analyzing and mining the warehouse data. Data mining techniques such as statistical and non-statistical supervised and unsupervised learning methods will be applied to problems drawn from the medical and business world.

ECMM 6016.03: Networking for Electronic Commerce.

This class will cover network protocols that lie at the base of the networks forming the infrastructure of the Internet. After covering the fundamentals of the OSI protocol stack and the operation of the TCP/IP protocol stack, the class will concentrate on applications and application level protocols used in the world-wide-web. The class will include projects that provide hands-on exposure to the major network protocols basic to the Internet.

ECMM 6018.03: Enterprise Networking for Electronic Commerce.

The objective of this class is to introduce practical issues for commerce application on the Internet. Internet services and network management are critical to increase the productivity of electronic commerce. This class explores the organization of Internet, examines practical issues of network management, and focuses on electronic commerce services such as middleware architectures.

ECMM 6020.03: Business Issues for Electronic Commerce.

For years businesses have been using the computer and information technology to achieve internal efficiencies. With the convergence of Information Technology and telecommunications over the last decade, Electronic Commerce has emerged to redefine the way that these organizations do business with their suppliers, customers and support infrastructure such as distribution providers and financial institutions. In particular, the class will examine the recent and rapid growth of Electronic Commerce from four approaches: an introduction to Electronic Commerce; EDI and re-engineering; Electronic Commerce and the Internet; and organizational issues in implementing Electronic Commerce.
CROSS-LISTING: BUSI 6520.03

ECMM 6022.06: IT Project Management.

The class will cover the principles of management for Information Technology Projects. The history of project management is rooted in Civil Engineering and manufacturing. Information technology projects have several notable differences. Students will learn those differences as well as generic principles of project management. Through case studies and field investigations of actual IT projects, students will gain a real-world understanding.
CROSS-LISTING: BUSI 6523.03

ECMM 6024.03: New Venture Creation.

New Venture Creation is about entrepreneurship: the process of creating new businesses. It employs cases, experiential exercises, and a major project to expose students to the issues, problems, and challenges of creating viable new business. The project provides students with the opportunity, within the framework of a formal class, to explore and develop business ideas they have been considering or wish to investigate. The final output of the project is a feasibility study, business plan, and financing proposal for a new venture.
CROSS-LISTING: BUSI 6002.03

ECMM 6026.03: E-Government; Information Technology: International Experiences and Perspectives.

This class will examine a multitude of information technological changes relevant to public administrators. The objectives are:
1. To understand the importance of information technology for Non-Profit organizations, especially governments.
2. To examine the use of information technology in Canada, other countries and other times in history.
3. To examine the effect of information technology on managing public sectors.
4. To develop skills and understanding of information technology that can be used effectively in public management, e.g., digital presentations, web based communications, video, and audio.
5. To understand the opportunities and problems that information technology presents to public administrators.
CROSS-LISTING: PUAD 6555.03

ECMM 6030.03: Issues in Law and Policy for Electronic Commerce.

This class will provide students in the proposed Master of Electronic Commerce degree program with an overview of law and policy issues in relation to electronic commerce. The class will introduce students to Canadian, U.S. and international policy making institutions and processes, and will illustrate these processes using examples from the emerging domestic and international law relating to electronic commerce. The class will be taught in a lecture format.

ECMM 6040.03: Research Methods.

A transition to research-based learning for e-commerce students. The course addresses the challenges of the research paper, project, or thesis. Through lectures, seminars, discussion, and presentations, students identify leading e-commerce research topics, evaluate literature critically and produce a research proposal-the foundation to the program's final phase.

ECMM 6068.03: Internet and Media Law.

This class deals with the law that governs the dissemination of information and the regulation of information providers. In this class, “media” is defined broadly to include the internet. Topics that will be addressed include: defamation; liability of service providers; privacy issues; publication bans; media regulation; copyright issues; conducting business via the internet ("e-commerce") and media ownership. The impact of the internet on the legal regulation relating to each of these topics will be explored throughout the class.

ECMM 6903.03: Special Graduate Topics in Electronic Commerce.

ECMM 7010.12: Industrial Internship.

ECMM 7030.06: Research Paper in Electronic Commerce.

ECMM 7051.12: Research Project in Electronic Commerce.

ECMM 9010.12: Graduate Thesis in Electronic Commerce I.

ECMM 9012.12: Graduate Thesis in Electronic Commerce II.

Engineering

Location: Office of the Dean of Engineering
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Dean, Faculty of Engineering

Leon, J., BSc (Dal), MSc (Dal), PhD (Dal), PEng

Associate Deans

Cyrus, P., BSc (Eng) (UWI), MASc, PhD (TUNS), PEng, Undergraduate and Associated Universities.

Satish, M.G., BSc, BECivEng (My), MEng, PhD (Concordia), PEng, Graduate Studies and Research

Assistant Dean

Watts, K.C., BSA, MSc, PhD, PEng. Student Affiars (Acting)

Administrative Assistant

Wood, C., BEd (MSVU), BSc (Acadia)

Graduate Studies and Research Officer

Laffin, D.

Admissions and Program Coordinator

Hillyard, H., BA (Dalhousie)

I. Introduction

Dalhousie University offers programs leading to Master's and Doctoral degrees in various branches of Engineering, Engineering Mathematics, Food Science and Technology and Naval Architecture and Marine Engineering.These graduate programs are offered through the Faculty of Engineering in accordance with the regulations of the Faculty of Graduate Studies and the Faculty of Engineering.

A. Areas of Study

Graduate programs are offered in Biological Engineering, Biomedical Engineering, Chemical Engineering, Civil Engineering, Electrical and Computer Engineering, Engineering Mathematics, Environmental Engineering, Food Science, Industrial Engineering, Mechanical Engineering, Materials Engineering and Minerals Resource Engineering, Petroleum Engineering, and Internetworking.

Biological Engineering

Programs offered are MEng, MASc, and PhD: Specific areas of Biological Engineering in which the Department has concentrated include biological waste management (disposal and reuse), biorobotics, agricultural engineering (drainage, soil erosion, farm machinery), aquacultural engineering, food processing engineering, renewable energy (solar and biomass), energy conservation in greenhouses, and pollution control (non-point source, wetlands). Please refer to the departmental entry, page 260, for additional information.

Biomedical Engineering

The School of Biomedical Engineering is a partnership between the Faculties of Engineering, Medicine and Dentistry. The programs offered are the MASC and PhD. Research interests include: biomaterials, bioelectricity and biomagnetism, medical imaging, physiological modelling, and rehabilitation. Please refer to the departmental entry, page 64 for additional information.

Chemical Engineering

The Department graduate program focuses on chemical process principles applied to environmental and energy resources. Topics include environmental considerations of combustion technology, fuel preparation, control of explosion hazards, development of innovative process control algorithms and treatment of industrial waste. Fundamental studies are done in mass transfer and rheology, Membrane Separation, Flotation, Coagulation, Gas-liquid System, Emulsification. Programs offered are MEng, MASc, and PhD. Please refer to the departmental entry,page 261, for additional information.

Civil Engineering

Programs offered are MEng, MASc, and PhD: Geotechnical Foundation Engineering, Structural Plastics, Wind Power Engineering, Timber Structures, Wood Engineering, Concrete Research, Geometric Design of Highways, Traffic Systems, Steel Structures, Structural Analysis, Wastewater Treatment, Water Pollution Control, Highway Materials, Environmental Engineering Hydraulics, Water Resources Engineering. Please refer to the departmental entry, page 83 for additional information.

Electrical and Computer Engineering

Programs offered are MEng, MASc, and PhD: Control Systems, Robotics, Instrumentation; Electric Power Systems; Electrical Machines, High-Voltage Engineering, Photovoltaic Solar Power Systems, Active and Switched-Capacitor Networks; Digital Communication Systems; Cardiovascular Dynamics, Medical Instrumentation, Medical Applications of Computers, Bioelectromagnetics; Ultrasonic Telemetry, Design of Integrated Circuits, Microprocessor-Based Systems. Please refer to the departmental entry, page 112 for additional information.

Engineering Mathematics

This is an interdisciplinary program between Engineering and Applied Mathematics, enabling mathematics and physics majors to carry out theoretical and numerical analysis of applied problems and engineering students to prepare mathematical models of engineering problems. Programs offered are MSc and PhD. Please refer to the departmental entry, page 125 for additional information.

Environmental Engineering

Interdisciplinary graduate studies and research are offered on a wide range of topics in Environmental Engineering: energy and environment, engineered wetlands and bioremediation, indoor air quality, soil erosion, water quality, waste management and remediation, pollution control and environmental assessment. This is an interdisciplinary program of the Faculty of Engineering leading the MEng and MASc degrees in Environmental Engineering and the PhD degree in Engineering. Contact the Faculty of Graduate Studies Office for more information.

Food Science

Research studies are offered on a wide range of topics in food processing, food microbiology, food chemistry, food rheology, microstructure, food engineering and fats and oils. Special emphasis is placed on seafood preservation, storage and handling. Programs offered are MSc and PhD. Please refer to the departmental entry, page 263 for additional information.

Industrial Engineering

Key areas of research interest in the Department are operations research modelling, mathematical optimization, production planning and control, modelling of economic systems, queueing theory, vehicle and crew scheduling, industrial ergonomics and work place design. Applications are primarily selected in the resource base industries of forestry, fishing and mining as well as the smaller sized local business. Programs offered are MEng, MASc, and PhD. Please refer to the departmental entry, page 170 for additional information.

Internetworking

The full fee Internetworking program has been designed in consultation with industry leaders to ensure that the graduates will have the core knowledge base for a rewarding career in the internetworking industry. There are ten classes, one per month from September to June. Each class has a significant hands on component in a modern internetworking laboratory.

The two week per class teaching format is intended to enable students from industry to participate, and to return to industry to apply their new knowledge. This is offered as an MEng program. Please refer to the departmental entry, page 181 for additional information.

Materials Engineering

Graduate studies at the Master's and PhD levels are offered; students should apply for these programs in the usual manner. Graduate studies at the Master's level are also offered as a co-operative, combined BEng. - MASc. program which is described in detail in the Undergraduate section of this Calendar. Present areas of study are in the chemical, physical and mechanical processing of metals, ceramics and materials, corrosion in marine and high temperature environments, mineral beneficiation, high temperature electrochemical processing and growth of opto-electronic materials. Programs offered are MEng, MASc, and PhD. Please refer to the departmental entry, page 265 for additional information.

Mechanical Engineering

Fluid Power Systems, Energy Conversion Systems, Fluidized Bed Combustion, Computational Fluid Dynamics, Vibration, CAD/CAM, CAE, Biomedical Engineering, Finite-Element Techniques, Machine and Rotor Dynamics, Machine Design, Robotics, Solar Energy Systems, Ship and Marine Hydrodynamics, Composites, Energy Management, Turbulence Modeling, Two-Phase Flow. Programs offered are MEng, MASc, and PhD. Please refer to the departmental entry, page 193 for additional information.

Minerals Resource Engineering

Programs offered are MEng, MASc, and PhD with research opportunities in the areas of geostatics, mine mechanization, coal mine support, computer applications in mining, mine waste management, ocean mining, mineral beneficiation, solid/liquid separation, mineral economics, reservoir engineering, horizontal drilling, petroleum drilling fluids, and oil shale studies. Please refer to the departmental entry, page 87 for additional information.

Naval Architecture and Marine Engineering

Programs offered are MEng, MASc, and PhD with a goal of providing well trained engineers for various important roles related to the sea, ships and maritime operations, and ocean structures. Research topics include mathematical and physical modelling. Please refer to the Mechanical Engineering Department for additional information.

Oil and Gas Engineering; Petroleum Engineering

The Faculty of Engineering's Oil and Gas Engineering Program encompasses a broad range of education and research activities relating to the oil and gas industry. The program is supported by expertise, experience and resources drawn from all of the departments in the Faculty. Petroleum engineering is viewed as a discipline focusing on the specialized knowledge associated with the production, transport and processing of petroleum products. Degree programs available include: MEng in Petroleum Engineering (see the Petroleum Engineering entry on page 226), and research degrees (MASc and PhD) associated with various engineering disciplines (see the oil and gas engineering entry on page 221).

II. General Information

A. Fees

Information pertaining to fees and expenses is given in the "Fees" section of this Calendar.

B. Financial Assistance

Information pertaining to financial assistance and scholarships is given in the "Awards" section of this Calendar.

C. Health Insurance Requirement

Information pertaining to health insurance requirements is given in the "Fees" section of this Calendar.

D. Application Forms

Application forms may be obtained from the Office of the Registrar, Dalhousie University, Halifax, Nova Scotia, B3H 4H6, or through the university's website on the Internet.

Prospective students are encouraged to contact the appropriate department for program specific information.

E. English Language Proficiency Requirement

Information pertaining to the English language proficiency requirements is given in the Faculty of Graduate Studies Regulations section of this Calendar.

F. Master's Degrees

A student's program of study for the Master's degree may be either a research intensive program (MASc) or a classwork intensive program (MEng). A Master's degree taken according to either program represents an equivalent standard of academic achievement. Note that a research Master's degree is normally required to gain admission into the PhD program.

G. Class Requirement

At least three-quarters (75%) of the total class requirement must be taken at the University. The graduate student's program submitted by the appropriate department and must be approved by the Engineering Graduate Studies and Research Office. Class requirements are given under the program requirements of the specific degrees.

H. Thesis/Project Requirement

A master's candidate will be required to submit a thesis/project satisfactory to the Faculties of Graduate Studies and Engineering and to make an oral presentation of the work. Doctoral candidates must complete a thesis and oral defence in accordance with Faculty of Graduate Studies procedures, but are also required to meet Faculty of Engineering requirements.

I. Leave of Absence

Students may formally apply for a leave of absence in accordance with Faculty of Graduate Studies regulations (see Faculty Regulations in this Calendar).

J. Admissions Criteria

All candidates must meet the admissions requirements of the Faculty of Graduate Studies, and any specific admissions requirements as listed under each program.

K. Procedures and Guidelines for Master's Theses and Projects

1. The Department is to ensure that supervisors are assigned to students as a prerequisite to admission. The Department must submit the name of the supervisor to the Engineering Graduate Studies and Research Office and the name will be officially recorded in the student's permanent file. If the supervisor is not a full-time member of the Department a co-supervisor will be appointed from the Department.
2. Granting of credits to a student's program of studies for classes taken prior to commencement of the program requires the recommendation of the Department and approval of the Faculty of Engineering normally in advance of registration. Note that some classes from local universities have been given "blanket" approval. Students should contact their departmental Graduate Coordinator for details.
3. The Department is to appoint a Supervisory Committee, within four months of the first registration, to be responsible for the Candidate's program and thesis/project preparation. The membership of the Supervisory Committee is to be conveyed to Engineering Graduate Studies and Research Office for approval and recorded in the student's permanent file. The Supervisory Committee will normally consist of the thesis/project supervisor, at least one other member of the department, and at least one other member from outside the department with special interests in the proposed area of study. The supervisor will be the chair of the Supervisory Committee.
4. The Supervisory Committee is required to submit a title for the student's thesis/project report, on the prescribed form, to Engineering Graduate Studies and Research Office at least four months prior to the formal submission of the thesis/project. On approval by the Engineering Graduate Studies and Research Office, the title will be recorded in the student's permanent file.
5. A clean copy of the thesis/project report accompanied by the form "Appointment in an Oral Examination" must be submitted to the Engineering Graduate Studies and Research Office at least 12 working days prior to the date of the oral defence. The Graduate Studies Office will co-ordinate the scheduling of the presentation and examination. The oral presentation and examination will not be scheduled until the following requirements for the student's program of studies have been met:
   - Class work completed;
   - Seminar requirement and the graduate seminar completed:
   - Supervisory committee approved;
   - Thesis/project title approved; and
   - Moderator appointed.
6. The thesis/project report is to be prepared to conform with the standards of the Faculty of Engineering Manual of Form "The Engineering Preparation of Graduate Theses" issued by the Engineering Graduate Studies and Research Office or on the Faculty's Website on the Internet.
7. The Department Head or his/her appointee (someone not involved as a member of the Supervisory Committee) shall be a moderator of the oral examination.
8. The student shall be advised by the Engineering Graduate Studies and Research Office of the approval of programs and the approval of thesis titles.
9. The student is required to deliver seminars according to the regulations of the Faculty of Engineering. The seminar requirement involves attending, and participating in, all Graduate Seminars held at the student's department/ program throughout the duration of the student's residency period, as well as making at least one seminar presentation. The department/program graduate coordinator is responsible from organizing the Graduate Seminars, and for deciding whether a student has met the requirement.

III. Master of Applied Science (MASc)

A. Admissions Requirements

A candidate to be considered to the Master of Applied Science research program must have obtained, with a high scholastic standing, an undergraduate degree in engineering or a degree in science with honours, or the equivalent, from a recognised university.

Candidates for the above degree may be required to take additional undergraduate subjects as a preparation for advanced classes or to give the candidate a suitable engineering background, but such subjects are seldom considered as part of the graduate program.

B. Academic Regulations

Program Requirements

An MASc graduate program consists of not less than four half-credit classes or their equivalent, the graduate seminar and thesis selected upon the advice of the thesis supervisor. Not more than one senior level undergraduate class may be taken as part of the four class requirement.

Examination Requirement

All classes required to meet the degree requirements are considered essential classes and will be so designated by the Supervisory Committee. Essential classes can include any required undergraduate or prerequisite classes. Any classes taken in excess of the requirements are subject to approval by the supervisor. These classes will appear on the student's transcript as regular classes.

All Master's degree candidates must pass all graduate level classes with a grade of at least B-. Any approved undergraduate class taken by a Master's candidate must be passed with a grade of at least B-. Graduate students are allowed to repeat only one class during their program in the Faculty of Engineering. Graduate students are not eligible to write supplementary examinations. Transfer credits from other universities will be considered on a case by case basis.

As well, all Master's degree candidates must pass an oral examination of their thesis or project after it has been submitted in satisfactory form.

In addition to meeting the grade requirements, failure to maintain an acceptable academic standing will result in a student being asked to withdraw from the program. Failure to achieve the minimum mark as noted above shall be considered grounds for dismissal.

Time Requirement

A candidate for a Master's degree will be required to spend at least twelve months' full time work on class work and the thesis. The time requirement for the Naval Architecture and Marine Engineering Program would normally be twenty months. All students are required to register each session to maintain eligibility to continue a program of studies. See Faculty of Graduate Studies Regulations for policies regarding the maximum length of time for degree completion and extensions.

IV. Master of Engineering (MEng)

A. Admission Requirements

A candidate to be considered for the Master of Engineering class work program must have obtained an undergraduate degree in engineering or its equivalent with high scholastic standing from a recognised university.

B. Academic Requirements

Program Requirements

The requirements for the class work Master of Engineering degree is not less than seven half-credit classes, the graduate seminar and the full-credit project. For the program requirements for the Master of Engineering (Internetworking), section VI. Undergraduate classes, in the area of a student's interest, not taken by the student for previous credit, may be included in the program, subject to prior approval. Not more than two classes may be undergraduate credits.

A project is required as a part of the program (one or two half-credits out of the required nine half-credits). Projects require the appointment of a supervisor and a supervisory committee.

Individual departments will assess applicants and select students for the program in their respective departments. Students' programs will be determined by the department in which the student is registered. All programs must have the approval of the department.

Entrance to the Master of Engineering Degree Program in Naval Architecture and Marine Engineering may be through one of two categories. For students who are graduates of an undergraduate degree program in Mechanical or Civil Engineering with high academic standing, the degree requirement consists of a total of fourteen half-credits, comprising twelve half-credit classes and a one full credit project. For candidates who already hold an undergraduate degree in Naval Architecture or Marine Engineering, the degree requirement consists of nine half-credits, seven half credit classes and a one full credit project, the same credit requirements as other Master of Engineering Degree Programs.

Candidates who are graduates of an undergraduate program in Civil Engineering may be required to register for a Qualifying period in additional undergraduate classes in Mechanical Engineering as "make-up" classes in preparation for the Naval Architecture and Marine Engineering graduate classes.

Examination Requirement

All classes required to meet the degree requirements are considered essential classes. Essential classes can include any required undergraduate or prerequisite classes. Any classes taken in excess of the requirements are subject to approval by the supervisor. These classes will appear on the student's transcript as regular classes.

All Master's degree candidates must pass all graduate level classes with a grade of at least B-. Any approved undergraduate class taken by a Master's candidate must be passed with a grade of at least B-. Graduate students are allowed to repeat only one class during their program in the Faculty of Engineering. Graduate students are not eligible to write supplementary examinations. Transfer credits from other universities will be considered on a case by case basis.

As well, all MEng degree candidates must pass an oral examination of their project after it has been submitted in satisfactory form.

In addition to meeting the grade requirements, failure to maintain an acceptable academic standing will result in a student being asked to withdraw from the program. Failure to achieve the minimum mark as noted above shall be considered grounds for dismissal.

Time Requirement

The minimum time requirement for completing the program is twelve months. A student is required to register each session to maintain eligibility to continue his/her program of studies. See Faculty of Graduate Studies Regulations for policies regarding the maximum length of time for degree completion and extensions.

V. Master of Engineering/Master of Planning (MEng/MPlan); Master of Applied Science/ Master of Planning (MASc/MPlan)

The School of Planning (Faculty of Architecture and Planning), in co-operation with the Department of Civil Engineering (Faculty of Engineering), offers two joint degrees in water resources engineering and planning (MEng/MPlan) and (MASc/MPlan). (A "joint" degree is defined as one where a single parchment is awarded, containing the names of both degrees.)

A. Admission Requirements

1. MEng/MPlan: a candidate, to be considered for the MEng/MPlan program, must have obtained an undergraduate degree in engineering with a high scholastic standing from a recognised university.
2. MASc/MPlan: to be considered for admission, a candidate requires an engineering degree with high scholastic standing, a science degree with honours and a high scholastic standing, or the equivalent of one of these through a combination of educational attainment and career experience.

B. Academic Regulations

MEng/MPlan Program Requirements

To receive the joint MEng/MPlan degree a student must:

1. Satisfy all mandatory class requirements for the MPlan program;
2. Satisfy all elective class requirements, as approved jointly by the School of Planning and the Department of Civil Engineering;
3. Complete the graduate seminar requirement;
4. Complete and defend a project guided by a project committee consisting of at least one instructor from the Department of Civil Engineering and one instructor from the School of Planning. The project must be accepted by the thesis committee and an external examiner approved by the two departments.
5. This degree is subject to the overall regulations of the Faculty of Engineering.

Note: For Planning requirements, consult the School of Planning. Engineering requirements include seven half-credits in Engineering plus the graduate seminar.

MASc/MPlan Program Requirements

To receive the joint MASc/MPlan degree a student must:

1. Satisfy all MPlan mandatory requirements, including the work period, with the exception of Class 2551.03, Water Resource Planning and Control, which will be replaced by an equivalent MEng class;
2. Choose, with the joint approval of the School of Planning and the Department of Civil Engineering, from the following list of classes (in preference to classes listed as electives under the MPlan from among these programs) electives:
   - IDIS 6032.03 Limnology
   - CIVL 4440.03 Water and Waste Treatment
   - CIVL 6115.03 Design of Water Treatment Plants
   - CIVL 6116.03 Biological Waste Treatment
   - CIVL 6117.03 Water Quality Management
   - CIVL 6135.03 Groundwater Chemical Quality
   - CIVL 6158.03 Groundwater Supply Protection
   - CIVL 6159.03 River Engineering
   - CIVL 6144.03 Geotechnical Aspects of Waste Management
   - CIVL 4430.03 Water Distribution and Sewerage System.
3. Complete the graduate seminar requirement
4. Complete a thesis equivalent to 2 full credits, under the guidance of an Examining Supervisory Committee that meets University regulations.
5. This degree is subject to the overall regulations of the Faculty of Engineering.

Note: Engineering requirements include four half-credits in Engineering plus the graduate seminar.

Time Requirements

The minimum period of attendance is two years but in cases where previous academic preparation specifically overlaps the class content of the degree program, credit may be given for those classes. It is unlikely that advance class credit will shorten attendance below two years.

The program is organized as follows:

Fall Term	Winter Term	Summer Term
P1 (Study)	P2 (Study)	P3 (Work Term)
P3 (Study)	P4 (Study)	

VI. Master of Engineering (Internetworking)

A. Admission Requirements

A candidate to be considered for the Master of Engineering in Internetworking program must have obtained an undergraduate degree in engineering or its equivalent with high scholastic standing. Applicants with industrial experience are encouraged to apply.

B. Academic Requirements

Program Requirements

The class requirement for the Master of Engineering in Internetworking is ten half-credit classes. An applicant may apply for challenge examinations for a maximum of up to two classes.

The program director or designates will assess applicants and select students for the limited number of seats available in the program. The program of study of each student will consist of the ten program classes in the approved sequence.

Examination Requirements

The ten program classes are considered required classes. All degree candidates must pass all classes with a grade of at least B-. Students are allowed to repeat only one class during their enrollment in the program. Failure to maintain the minimum mark as outlined here shall be considered grounds for dismissal.

Candidates will be required to pass an oral examination of their project after the report has been submitted in a satisfactory form.

Class Scheduling

The classes are scheduled one per month in either a 2-week or 3-week period requiring 14 days of study. Each class requires 14 days on-site at Dalhousie. This intensive delivery method has been chosen to allow students holding positions in industry to attend classes on a part-time basis.

VII. Master of Science (Engineering Mathematics)

A. Admission Requirements

For admission into the Master of Science program in Engineering Mathematics, a student must have completed with high standing, a Bachelor's degree in Engineering or an honours (i.e. 4 year with research project or dissertation) Bachelor's degree with at least two full year mathematics classes at the third year level, one of them in differential equations.

Applicants who do not meet the above requirements may be admitted to a Qualifying Program in which they would take additional classes which will raise their total preparation to the level of an honours degree. These additional classes and completion of the Qualifying Program will be considered a prerequisite to admission to the Master of Science program.

B. Academic Regulations

Program Requirements

The program will consist of at least 4 half-credit classes and a thesis selected upon the advice of the thesis supervisor. Not more than one class shall be at the final year undergraduate level and may be chosen from the offerings of the other Departments of the Faculty of Engineering and the Faculty of Computer Science.

Examination Requirement

All classes required to meet the degree requirements are considered essential classes and will be so designated by the Supervisory Committee. Essential classes can include any required undergraduate or prerequisite classes. Any classes taken in excess of the requirements are subject to approval by the supervisor. These classes will appear on the student's transcript as regular classes.

All Master's degree candidates must pass all graduate level classes with a grade of at least B-. Any approved undergraduate class taken by a Master's candidate must be passed with a grade of at least B-. Graduate students are allowed to repeat only one class during their program at Dalhousie. Graduate students are not eligible to write supplementary examinations. Transfer credits from other universities will be considered on a case by case basis.

As well, all Master's degree candidates must pass an oral examination of their thesis or project after it has been submitted in satisfactory form.

In addition to meeting the grade requirements, failure to maintain an acceptable academic standing will result in a student being asked to withdraw from the program. Failure to achieve the minimum mark as noted above shall be considered grounds for dismissal.

Time Requirement

A candidate for the degree of Master of Science in Engineering Mathematics will require at least twelve months to complete the degree. A student is required to register each session to maintain eligibility to continue his/her program of studies. See Faculty of Graduate Studies Regulations for policies regarding the maximum length of time for degree completion and extensions.

VIII. Master of Science (Food Science)

A. Admission Requirements

For admission into the Master of Science Program in Food Science, students must have a BSc degree from any recognised university in any of the following disciplines:

- Food Science;
- Dairy Science;
- Chemistry/Biochemistry;
- Microbiology;
- Nutrition or Home Economics with suitable background;
- or a Bachelor of Engineering.

Students will be considered for the program on the basis of undergraduate academic standing and background. Candidates without Food Science training at the undergraduate level will likely be required to attend appropriate undergraduate classes offered in the program. All candidates must meet the minimum admission requirements for the Faculty of Graduate Studies.

B. Academic Regulations

Program Requirements

The graduate program consists of not less than 4 half-credit classes (or their equivalent) and the graduate seminar and a thesis is selected upon the advice of the thesis supervisor. The graduate student's program is submitted by the Food Science Program for review by Engineering Graduate Studies and Research Office.

Examination Requirement

All classes required to meet the degree requirements are considered essential classes and will be so designated by the Supervisory Committee. Essential classes can include any required undergraduate or prerequisite classes. Any classes taken in excess of the requirements are subject to approval by the supervisor. These classes will appear on the student's transcript as regular classes.

All Master's degree candidates must pass all graduate level classes with a grade of at least B-. Any approved undergraduate class taken by a Master's candidate must be passed with a grade of at least B-. Graduate students are allowed to repeat only one class during their program. Graduate students are not eligible to write supplementary examinations. Transfer credits from other universities will be considered on a case by case basis.

As well, all Master's degree candidates must pass an oral examination of their thesis or project after it has been submitted in satisfactory form.

In addition to meeting the grade requirements, failure to maintain an acceptable academic standing will result in a student being asked to withdraw from the program. Failure to achieve the minimum mark as noted above shall be considered grounds for dismissal.

Time Requirement

A candidate for a Master of Science in Food Science degree will be required to spend at least twelve months' full-time work on class work and the thesis. A student is required to register each session to maintain eligibility to continue his/her program of studies. See Faculty of Graduate Studies Regulations for policies regarding the maximum length of time for degree completion and extensions.

IX. Master of Business Administration/ Master of Engineering

This is a 2 year program that enables students to select classes which will allow them to graduate with a Masters of Engineering and Master of Business Administration. This combination provides graduates with a diverse skill set in two high demand disciplines and also serves as an outstanding tool for the future. Candidates for the MBA/MEng program must satisfy the entrance requirements for both the Faculty of Engineering and the School of Business. Students may obtain further information about the combined program by contacting the Faculty of Engineering or the Admissions Officer of the MBA program.

Plan of Study:

- Nine (9) 1/2 credits of MBA core - excluding #5503 Quantitative Decision Making
- Five (5) 1/2 credits of master's level Engineering courses
- Six (6) 1/2 credits of MBA electives
- Two (2) 1/2 credits of an approved project that has an engineering focus
- All non-credit requirements for both programs including Communication and Career

Dates:

Deadlines for applications for MEng:

September:	International Students: April 1st
	Canadian Students: June 30th
January:	International Students: August 31st
	Canadian Students: October 31st

X. Co-op Master's Degrees

The Faculty of Engineering offers MASc (Co-op), MSc (Co-op) and MEng (Co-op) degrees. Participation in the co-op program requires a co-op research project suitable for a master's thesis (for co-op MASc and MSc degrees) or a master's project (for co-op MEng degree), and the student's acceptance by a faculty member in the Faculty of Engineering as well as a suitable sponsoring organization. The faculty member who will supervise the graduate student will determine the suitability of a project for master's level research.

The academic requirements for co-op master's degrees in Engineering are identical to those for regular (i.e. non-co-op) degrees with the addition of a minimum of eight months, or up to twelve months, of co-op work term(s). During the work terms, the graduate student will work on a research project that will form the basis of his/her master's thesis/project. The graduate student will conduct all or part of the research work as part of his/her co-op work at the employer's site. Also, all co-op graduate students should complete the "Co-op Workshop" offered by the TEchnical Co-operative Education Office before going on a work term.

Academic/Work term schedules shall be designed by the Supervising Committee of the graduate student taking into consideration the requirements of the research project as well as the needs of the student and the employer. In developing the schedules, the Supervising Committees shall adhere to the following guidelines:

1. The last term before completion of the degree requirements shall be an academic term.
2. The first co-op work term in the MASc and MSc programs will normally be taken after completing at least three half-credit courses.
3. The first co-op work term in the MEng program will normally be taken after completing at least four half-credit courses.
4. Provided that conditions 1-3 above are satisfied, co-op work terms may be:
   - Alternate semesters
   - Summers only
   - One, two or three consecutive semesters
   - Parallel (part-time) with study
   - Other combinations

The normal upper time limits for the completion of co-op master's degrees will be the same as those for non-co-op degrees, i.e. four years for full-time and five years for part-time studies. The Supervisory Committee of co-op master's students will normally include the student's industrial supervisor as a member, or if appropriate (based on Faculty of Graduate Studies and Faculty of Engineering regulations), as a thesis/project co-supervisor. This arrangement will be agreed upon by the academic supervisor and the company before the student begins the program.

XI. Doctor of Philosophy

A. Admission Requirements and Procedures

A candidate to be considered for entrance into the PhD program must meet the admission requirements of the Faculty of Graduate Studies and must have:

- A research Master's Degree in engineering from Dalhousie University or any other recognised university, or a Master of Science Degree or its equivalent from a recognised university, acceptable to the Faculty of Engineering (in which case, a candidate may be required to take extra subjects to provide a suitable engineering background); or,

- Acceptance for registration as a candidate for a research Master's degree at this University.

A candidate registered for a Master's Degree may be transferred to a Doctoral Degree on the recommendation of his/her department, according to the Regulations of the Faculty of Engineering. The recommendation will be reviewed by the Faculty of Engineering Graduate Studies Committee.

An application for admission to the graduate program leading to the degree of Doctor of Philosophy should have a superior academic record and previous training or experience which indicates that the candidate should be able to do independent research.

Doctoral candidates are not admitted without appropriate funding to support the student and the program of research.

B. Health Insurance Requirement

Information pertaining to health insurance requirements is given in the "Fees" section of this calendar.

C. Academic Regulations

All doctoral programs are developed under the regulations and procedures of the Faculty of Graduate Studies (see Faculty of Graduate Studies Regulations in this Calendar) and each program must be approved by the Faculty of Engineering and the Faculty of Graduate Studies.

Class Requirements

Doctoral programs in Engineering normally require a minimum of four classes (i.e. four half-credits), the graduate seminar, plus a thesis. No undergraduate classes are allowed for credit in a Doctoral Degree program.

Thesis Subject Matter and Supervision

The thesis shall consist of an original investigation or design carried out under the immediate supervision of a member of the Faculty of Engineering who is also a member of the Faculty of Graduate Studies.

Admission from Master's Degree

Based on starting from a Master of Applied Science Degree, a candidate must complete not less than four classes (i.e. four half-credits) and the graduate seminar. These classes will normally be selected in consultation with the research supervisor and supervisory committee, and must be approved by the Faculty of Engineering and the Faculty of Graduate Studies.

Thesis Requirement

A candidate will be required, as a major part of the program, to submit a satisfactory thesis embodying the results of original scholarship and independent research. See Faculty of Graduate Studies Regulations for information pertaining to doctoral theses.

Examination Requirements

All classes required to meet the degree requirements are considered essential classes and will be so designated by the Supervisory Committee. Essential classes can include any required undergraduate or prerequisite classes. Any classes taken in excess of the requirements are subject to approval by the supervisor. These classes will appear on the student's transcript as regular classes.

A PhD degree candidate must pass all graduate level classes with a grade of at least B. Graduate students are allowed to repeat only one class during their program. Graduate students are not eligible to write supplementary examinations. Transfer credits from other universities will be considered on a case by case basis.

PhD candidates are also required to pass comprehensive examinations which normally take place within the fourth study term. Students who receive a "fail" on the comprehensive examination will be asked to withdraw. Students who receive a marginal fail may be permitted to rewrite once. See Procedures and Guidelines, Section 5, below.

As well, all PhD degree candidates must pass an oral examination of his/her thesis project after it has been submitted in satisfactory form, and in accordance with the Faculty of Graduate Studies regulations.

In addition to meeting the grade requirements, failure to maintain an acceptable academic standing will result in a student being asked to withdraw from the program. Failure to achieve the minimum mark as noted above shall be considered grounds for dismissal.

Time and Residence Requirements

A candidate for the PhD degree must spend the equivalent of three calendar years of full time work on lectures and the thesis. However, credit for one calendar year may be granted for a Master's degree or its equivalent. A student is required to register each session to maintain eligibility to continue his/her program of studies. A PhD candidate shall spend at least two years in full time attendance of his/her research work at the University. See Faculty of Graduate Studies Regulations for policies regarding the maximum length of time for degree completion and extensions.

Procedures and Guidelines

1. The Department must ensure that supervisors are normally assigned to students prior to their registration. If the supervisor is not a full time member of the Department, a co-supervisor will be appointed from the Department. The Department is to submit the name of the supervisor to Faculty of Engineering Graduate Studies and the name will be officially recorded in the student's file.
2. Granting of credits to a student's program of studies for classes taken prior to commencement of the program requires the recommendation of the Department and approval of the Faculty of Engineering Graduate Studies Committee. A request for this transfer of credits must be made to the Department before the student's first registration or in the first term.
3. The supervisor is to appoint a Supervisory committee, within four months of the first registration, to be responsible for the Candidate's program and thesis preparation. The membership of the Supervisory Committee is to be conveyed for approval to the Engineering Graduate Studies Office and recorded in the student's file. The Supervisory Committee will normally consist of the thesis supervisor, at lest one other member from the department and at least one other member from outside the department with special interests in the proposed area of study. The supervisor will be the chair of the Supervisory Committee. The Supervisory Committee is encouraged to submit progress reports once every six months to the Department's Graduate Co-ordinator.
4. The Supervisory Committee is required to submit a title for the student's thesis report, on the prescribed form, to the Engineering Graduate Studies and Research Office at least seven months prior to the formal submission of the thesis. On approval by Graduate Studies, the title will be recorded in the student's file and forwarded to the Faculty of Graduate Studies.
5. The Supervisory Committee shall be responsible for conducting the comprehensive examinations. The purpose of these examinations are to ensure that the student has a thorough understanding of the fundamentals in the student's area of study and that the student has attained knowledge to an adequate level in the discipline. The comprehensive examination consists of at least two written examination papers and an oral examination conducted to meet the above objective. The written papers are to be set and assessed by examiners recommended by the Supervisory committee. The comprehensive examination shall normally be completed within the fourth session of study from first registration. A student shall be given at least three months notice of the examination. The topics and results of the examination will be conveyed to the Engineering Graduate Studies and Research Office on the prescribed form and will indicate "pass", "fail", or "re-examination". Recommendation of the examining committee to re-examine shall only be permitted if the failure was marginal. Students receiving a recommendation of "fail" shall be required to withdraw from the program by the Registrar's office. Re-examination of marginal students must be carried out within six months of the initial examination. Students requiring re-examination

shall not necessarily be required to rewrite both written examinations. Students given the opportunity to rewrite shall only be permitted to rewrite once.

6. An Examining Committee is appointed in accordance with Faculty of Graduate Studies procedures prior to the formal submission of the thesis report. The Examining Committee normally consists of the Supervisory Committee and an external examiner. At least two members of the Examining Committee must be from the candidate's Department. The composition of the committee is to be recorded in the student's file. The names of three external examiners will be recommended to the Engineering Graduate Studies and Research Office. The External Examiner will be approached and appointed by the Engineering Graduate Studies and Research Office according to Faculty procedures.
7. A sufficient number of copies of the thesis must be submitted to the Engineering Graduate Studies and Research Office at least five weeks prior to the date of the oral defence. One copy will be sent to the External Examiner, the second will be retained by the Engineering Graduate Studies and Research Office. The copies must be accompanied by the appropriate form. The Engineering Graduate Studies and Research Office will co-ordinate the scheduling of the presentation and examination according to Faculty procedures. The oral presentation and examination will not be scheduled until the following requirements for the student's program of studies have been met:
   i) Class work completed;
   ii) Thesis title approved;
   iii) The graduate seminar requirement completed;
   iv) Examining Committee established;
   v) Comprehensive examination passed;
   vi) A written report has been received by the Engineering Graduate Studies and Research Office from the external examiner.
8. The student shall be advised by the Engineering Graduate Studies and Research Office of the approval of programs, the results of comprehensive examinations, and the approvals of the thesis title and committees.
9. The thesis is to be prepared to conform with the standards of the manual for the Preparation of Graduate Theses, available at the Graduate Studies and Research Office, Faculty of Engineering.
10. The Associate Dean of Engineering (Graduate Studies and Research) shall be the Chair of the Examination or shall appoint someone from the Faculty's Panel of PhD Chairs. The oral defence and examination shall be carried out according to Faculty of Graduate Studies procedures.

Award of Degree

A candidate will not be awarded the PhD degree unless they have satisfied all the foregoing requirements.

XII. Class Descriptions

Not all subjects will be offered in any one year.

IDIS Series: Interdisciplinary Classes

IDIS 6003.03: Materials Science.

Advanced topics on the physical and thermal properties of representative materials (metals, ceramics, composites and plastics) are discussed in relation to thermodynamics and kinetics of phase transformations. The electrical properties of metals, semiconductors and insulators are reviewed in terms of the modification of these properties by chemical substitution. The relation of mechanical properties of the materials to the proper selection process for materials for a specific application is discussed. Case studies are used to illustrate integration of the above topics.

IDIS 6004.03: Solid State Engineering.

An interdisciplinary class covering: selected topics in crystallography, including space groups and space lattices, bonding forces and the mechanism of crystal growth; imperfections in solids-vacancies, interstitial, dislocations and the properties of defects; the preparation of materials-metals, semiconductors, ceramics, ferrites, polymers, vapour deposition technique, growth of single crystals from solution, metal and vapour, the mechanical, electrical and magnetic properties of materials; the design of electronic devices, e.g., microwave devices such as ferrite isolators and parametric amplifiers and semiconductor devices, which utilize the special properties of materials prepared by the student. The experimental work will involve the synthesis of ferrites, semiconductors, etc., their examination by X-ray powder photographs and measurements of their properties such as Hall effect, etc.

IDIS 6006.03: Optimization in Engineering.

Nature and systems considered in engineering and physics have an abundance of examples where an optimum system status is sought. The course aims to provide the students with advanced theory of optimization and topics that arise in applications of the optimization techniques. The challenge of this course is to increase the utilization of the optimization methods by development and use of appropriate algorithms derived for specific problems in engineering and physics. They include those arising in VLSI design, computer engineering, chemical reactor control, in spin glasses as well as in networking, particularly in networks with frequently changing topology. State-of-the-art of the advanced optimization techniques is presented. Geometric interpretations, time-space decompositions and large- and small-scale considerations are stressed wherever possible.
INSTRUCTOR(S): A. Bogobowicz
FORMAT: Lecture 3 hours
PREREQUISITE: Permission from instructor
CROSS-LISTING: ECED 6650.03

IDIS 6010.03: Industrial Waste Management.

Industrial processes that generate solid, liquid and gaseous wastes will be reviewed and methods of control will be discussed. Waste management systems that include recycling, recovery and reuse will be considered. Examples will be drawn from Nova Scotia industry and students will be required to undertake case studies of selected industries.

IDIS 6011.03: Water Resources Management and Planning.

This class will cover planning and management considerations that are important in water-related engineering decisions. Topics to be considered are: constitutional and legal frameworks for water management in Canada and Nova Scotia; conceptional approaches to water management; water use and management issues; nature and purpose of water management; water management frameworks and functions; and institutional arrangements for water management.

IDIS 6013.03: Environmental Health Engineering.

Radiological health, air pollution control, solid waste treatment, vector control, milk and food sanitation, industrial hygiene.

IDIS 6030.03: Energy Resources and Utilization.

This class surveys world energy resources and examines the technical feasibility for utilization. The class will attempt to evaluate elements for the Canadian energy policy.

IDIS 6031.03: Energy and the Environment.

This class examines the physical nature of energy resources and the impact of their development on environmental quality. Technological options to alleviate impact will be examined.

IDIS 6032.03: Limnology.

A review of the basic principles of the chemical, physical and biological nature of surface waters will be followed by an examination of advanced topics related to water management.

IDIS 6110.03: Open Channel Hydraulics.

This advanced class will begin with a review of basic concepts of fluid flow. The class will deal with the energy principle and the momentum principle in respect to open channel flow; flow resistance in uniform and nonuniform flow computations; channel controls; channel transitions; and sediment transport.

Engineering Mathematics

Location: 1340 Barrington St.
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Email: engineering.mathematics@dal.ca

Department Head

Phillips, W.J., BSc(Eng), MSc (Qu), PhD (UBC). Algorithms and implementation for communication networks

Professor Emeritus

Jaeger, L.G., BA, MA (Cantab), PhD, DSc (London), DEng (Carleton, Memorial, TUNS), PEng, FRSE, FEIC, FCSCE

Professors

Fenton, G.A., BEng, MEng (Carleton), MA, PhD (Princeton), PEng. Random field theory with applications to engineering problems.

Kember, G., BSc, MSc, PhD(UWO). Dynamical systems and the analysis of geophysical and medical time series data.

Rahman, M., BSc (Hons), MSc (Gauh), DIC(Imp Coll), MPhil (London), PhD (Windsor), DSc (Eng) (London), CMath, FIMA.Computational fluid dynamics, hydrodynamics, wave loads on offshore structures, wave-ice-current interactions: its implications on ice-loads.

Robertson, W., BSc (Eng. Hons), MSc (Eng) (Aberdeen), PhD (TUNS), PEng. DSP architecture and algorithms and internetworking applications.

Associate Professor

Iakovlev, S.V., MSc, PhD (St. Petersburg), PEng. Fluid-structure interaction.

Assistant Professor

Gentleman, W., BEng (Hons) (McGill), PhD (Dartmouth College). Modelling of marine ecosystem dynamics related to fishereis and climate change.

Adjunct Professor

Perrie, W., BSc (Toronto), PhD (MIT)

Adjunct Associate Professors

Dubay, R., BSc, MPhil (University of West Indies), PhD (DalTech), PEng.

Hannah, C.G., BASc (University of British Columbia), PhD (University of British Columbia), PEng.

Sivakumar, S.C., BEng (Bangalore), MASc, PhD (TUNS), PEng.

I. Introduction

The Department of Engineering Mathematics offers programs leading to MSc and PhD degrees in Engineering Mathematics.

The program gives a specialization in Applied Mathematics together with the engineering background required for work with engineers and scientists on problems that require a combination of engineering insight and rigorous mathematical analysis. It also prepares the student for work on engineering problems in research centres and industry. The program is designed for students who have already completed an undergraduate program in Mathematics, Physics, Computer Science, or Engineering. See section on Engineering for general program regulations.

II. Class Descriptions

ENGM 6000.03: Directed Studies in Applied Mathematics.

This class is offered to graduate students enrolled in Applied Mathematics who wish to gain knowledge in a specific area for which no appropriate graduate level classes are offered. Each student taking this class will be assigned a suitable class advisor familiar with the specific area of interest. The student will be required to present the work of one term (not less than 90 hours in the form of directed research, and individual study) in an organized publication format.

ENGM 6600.03: Finite Mathematics.

Introduction to the theory of sets, numbers, groups, rings, field, vector spaces, lattices, Boolean algebra and graphs with emphasis on finite structures. Algorithms for the solution of optimization problems. Applications in the fields of computer design, automata theory, and combinational analysis.

ENGM 6610.03: Wavelets and Filter Banks.

This class explains wavelets and filter banks using both the language of filters and the language of linear algebra. The class concentrates on the underpinnings of this relatively young (1980's) subject which has now stabilized. Applications to the areas of image and video compression, speech, audio and ECG compression and denoising are presented.

ENGM 6611.03: Functions of Complex Variables.

This class is concerned with the theory of functions of complex variables and its applications in various branches of science and engineering. Topics included are: analytic functions, Cauchy-Riemann conditions, elementary functions, simple mappings, complex integrations, Taylor's and Laurent's expansions; the calculus of residues and its applications in computing integrals; the use of Bromwich contour and Nyquist stability criterion; the application of conformal mappings i.e. Schwartz-Christoffel transformation to the solution of fluid-flow, heat transfer and electrical potential problems; and the integral form of Poisson's equation.

ENGM 6612.03: Methods of Applied Mathematics I.

Laplace transformations and initial value problems, two point boundary value problems, Green's functions, eigenvalues and eigenfunctions, eigenfunction transforms. General integral transforms, finite Fourier transforms. Hankel transforms, Bessel's functions.
PREREQUISITE: ENGM 3311.03, ENGM 3322.03

ENGM 6613.03: Methods of Applied Mathematics II.

Linear partial differential equations. Derivation of classical equations, classification and boundary condition, separation of variable technique, integral transform method of solving partial differential equations.
PREREQUISITE: ENGM 6612

ENGM 6616.03: Mathematical Programming I.

Linear programming problems, primal and dual simplex algorithms, duality theory. Integer programming, Gomory algorithms. Dynamics programming.

ENGM 6617.03: Mathematical Programming II.

Transportation and transshipment algorithms with emphasis on modern computer codes. General network models. Optimization problems defined on graphs. Kuhn-Tucker theory. Non-linear programming methods.

ENGM 6620.03: Functional Analysis.

Metric spaces and elementary topology, completeness, contraction mapping, fixed point theorem with applications to linear systems and differential and integral equations. Linear spaces (vector space) and linear operators. Normed linear spaces. Banach spaces. LP spaces with an introduction to Lesbeque integrals. Hilbert spaces orthonormal sets, Fourier expansion. Linear functionals on normed linear spaces, conjugate spaces, adjoint operator, theorem of Hahn-Banach.

ENGM 6621.03: Vibrations and Waves.

Vibrations and transient response of linear lumped-parameter physical systems. Analogies between electric circuits, mechanical systems and acoustics. Systems with one degree of freedom. Systems with non-linear and variable spring characteristics. Method of successive approximations and Ritz method of non-linear vibrations.
Vibratory systems with several degrees of freedom. Approximate methods of calculating frequencies of natural vibrations. Solution of eigenvalue problems by matrix iteration. Vibration of elastic bodies. Wave equation. Applications of rods, plates and shells. Plane waves and spherical waves in unbounded homogeneous elastic media.
Elements of harmonic wave phenomenon; reflection, resonance, relaxation and reverberation. Wave propagation through fluid and solid layers.

ENGM 6631.03: Mathematical Theory of Elasticity.

The mathematical theory of elasticity in two and three dimensions. General differential equations in cartesian, polar coordinates, compatibility equation and boundary conditions. Fourier series and general Fourier solution of elasticity problems. Plane elasticity problems using non-orthogonal functions. Energy principles and variational technique. Torsion of various-shaped bars.

ENGM 6632.03: Theory of Plates and Shells.

Differential equation of plates. Boundary conditions. Rigorous solution of the governing differential equation for various kinds of edge supports and different kinds of loading. Solutions by single and double trigonometric series. Bending of plates on elastic foundations and continuous rectangular slabs. Approximate methods in the theory of plates. Membrane theory of thine shells. Bending theory of cylindrical and spherical shells.

ENGM 6633.03: Dynamics of Elastic Systems.

General differential equations of elastic systems. Longitudinal, transverse, and torsional vibrations of rods. Free and forced vibrations of continuous beams. Transverse vibrations of plates. Transverse vibrations of shells. Propagation of elastic waves. Approximate methods.

ENGM 6634.03: Theory of Elastic Stability.

Differential equations of beam-column under transverse and axial loads. Elastic buckling of bars and frames. Torsional and lateral buckling of beams. Buckling of rings and curved bars. Buckling of thin plates under various loads and having different edge supports. Buckling of thin cylindrical shells.

ENGM 6656.03: Splines and Variational Methods.

In this class, the variational formulation of partial differential equations is introduced. Emphasis is placed on the application of spline functions to the solution of initial and boundary value problems.
The minimum energy property of spline and its relationship to the beam bending theory is studied.
Students will be required to write some computer programs to become familiar with the computer implementation of these ideas.

ENGM 6657.03: Numerical Linear Algebra.

The topics covered in this class include: matrix and vector norms, condition number, singular value decomposition, LU decomposition, QR decomposition, Cholesky decomposition, error analysis and complexity of matrix algorithms, Toeplitz matrix algorithms, orthogonalization and least squares methods, the symmetric and unsymmertric eigenvalue problems, and iterative methods. The student is expected to code most of the algorithms on the computer.
PREREQUISITE: Ability to program in C or Fortran.

ENGM 6658.03: Numerical Solution of Differential Equations.

This class begin with a study of solution techniques or ordinary differential equations. Then a review of the basic partial differential equations of engineering mathematics is undertaken. The finite difference method is used to discretize these equations and concepts of stability, consistency, and convergence in the solutions are introduced. The student is expected to write several computer programs.
PREREQUISITE: Ability to program in C or Fortran.

ENGM 6659.03: Finite Element Solution of Linear Partial Differential Equations.

This class covers aspects of the solution of linear static and dynamic partial differential equations through the use of finite element models derived from the Galerkin approximation. Emphasis is placed on the derivation of the approximate matrix equations from the strong form of the boundary value problem and on issues concerning the accuracy of the solution, on integration techniques, completeness, and element tests. Students are expected to code and validate an element appropriate to their specific research interests.
PREREQUISITE: Familiarity with partial differential equations and numerical linear algebra.

ENGM 6660.03: Finite Element Solution of Non-Linear Partial Differential Equations.

This class covers aspects of the solution of non-linear partial differential equations through the use of finite element models. Emphasis is placed on the modeling of engineering materials. The class addresses such topics as common plasticity relationships, numerical implementation of various yield models, finite deformations, consistent linearization schemes, and theorems dealing with existence, uniqueness and stability. Students are expected to implement a non-linear finite element algorithm on the computer.
PREREQUISITE: ENGM 6659.03 is recommended

ENGM 6661.03: Theory of Waves in Potential Flow.

This class deals with the theory of water waves and its use in advanced engineering applications. Topics covered include: the fundamental equations of motions in fluids; the developments of Euler's equations of motion for inviscid fluids; Bernuolli's equation; various analytical techniques for solving partial differential equations arising in water wave theory; small amplitude theory and propagation of surface waves in deep, shallow and intermediate depth water; dispersion relation of wave propagation, phase-velocity, group-velocity; linear and non-linear concepts of diffraction; and one-dimensional tides in canals.
PREREQUISITE: ENGM 3211.03, ENGM 3222.03

ENGM 6662.03: Dynamics of Ocean Fluids.

This class is concerned with the dynamics of ocean fluids. Topics included are: dynamics of progressive and standing waves (long waves) in two-dimensional basins, tidal dynamics; Kelvin and Poincare waves; Stokes nonlinear wave theory; regular, irregular and random waves; wave statistics, wave energy and spectrum; wave forces on fixed/floating offshore structures; solution techniques such as the Morison equation, Froude-Krylov and diffraction/potential theory; numerical methods such as Green's function and BEM; long waves in shallow water; Cnoidal, solitary waves and inverse scattering.
PREREQUISITE: ENGM 6661.03

ENGM 6671.03: Applied Regression Analysis.

This class will emphasize practical rather than theoretical considerations and will make extensive use of computer packages. The topics to be covered include: simple linear regression, analysis of residuals and remedial measures, transformation of data, multiple, polynomial and weighted regression, model selection techniques, joint confidence regions, use of indicator variables, analysis of covariance and an introduction to non-linear regression.

ENGM 6672.03: Experimental Design in Statistics.

This class deals with both practical and theoretical considerations, but emphasis will be put on practical situations. The following topics will be covered: Analysis of variance, analysis of covariance, optimality of designs, experimental designs and their analysis, factorial experiments and non-parametric analysis of variance.
PREREQUISITE: A first class in Probability and Statistics.
CO-REQUISITE: Class ENGM 6671.03 is a complimentary class of ENGM 6672.03

ENGM 6673.03: Nonparametric Statistical Methods.

Alternative to the standard parametric methods are covered in this class. Topics to be discussed are: The general theory of rank based tests; tests based on ranks for two treatments; testing of randomness, symmetry and independence; and finally estimation based on ranks. Existing statistical packages will be used.

ENGM 6674.03: Theory of Random Fields.

This class is an introduction to the theory of multidimensional random processes which serve as models of natural phenomena, for example engineering materials, loads, and other distributed disordered systems. Topics covered include classical probability concepts and methods in a random field context, level excursions and extremes, spectral moments and associated measures of disorder, and simulation techniques. Applications to Monte Carlo simulations models are introduced.
PREREQUISITE: A working knowledge of basic probability theory and some statistics

ENGM 6675.03: Risk Assessment and Management.

This class introduces risk assessment and system reliability methodologies, from classical event trees to simulation. Examples of risk-based decision making analyses will be covered, ranging from oil exploration to environmental site remediation. The student will carry out a risk assessment involving design decisions on a project of their own choosing.

ENGM 6680.03: Ecosystems Modeling of Marine and Freshwater Environments.

Students develop and apply mathematical models of marine and freshwater ecosystems to study biological production, biogeochemical cycling etc. Lectures provide theoretical background for coupling nutrient and plankton dynamics, including parameterizing biological processes and physical effects. Computer sessions provide hands-on modelling experience. Students also critique literature and conduct an independent research project.
FORMAT: Lecture, Computer Programming and Discussion
CROSS-LISTING: OCEA 5680.03, ENGM 4680.03

ENGM 9000.00: Master's Thesis.

ENGM 9530.00: PhD Thesis.

English

Location: 6135 University Avenue
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Telephone: (902) 494-6924
Fax: (902) 494-2176
Email: gradengl@dal.ca
Website: http://english.dal.ca

Chairperson of Department

Furrow, M.

Professors Emeriti

Fraser, J., MA (Oxon), PhD (Minn), FRSC
Gray, J., MA (Aberd), MA (Oxon), PhD (Mont), FRSA, FRSC, McCulloch Professor of English
Sprott, S.E., MA, BD (Melbourne), PhD (Columbia)

Professors

Barker, W., AB (Dartmouth College), MA, BEd, PhD (Toronto). Renaissance literature.
Baxter, J.R., BA, BEd, MA, PhD (Alta). Renaissance literature.
Diepeveen, L., BA (Calvin), MA, PhD (Ill). Modern American literature.
Furrow, M.M., BA (Dal), MA, MPhil, PhD (Yale). Medieval literature.
Huebert, R.M., BA (Sask), MA, PhD (Pitt). Renaissance literature.
Luckyj, C., BA, MA, PhD (Toronto). Renaissance literature.
Stone, M., BA (Guelph), MA, MPhil (Waterloo), PhD (Toronto). Feminism and victorian literature.
Tetreault, R.R., BA (UBC), MA, PhD (Cornell). Romantic literature.
Wainwright, J.A., BA (Toronto), MA, PhD (Dal). Canadian literature (McCullough Professor in English).

Associate Professors

Barker, R., BA (Kings), MA (Dal), PhD (Birmingham), major appointment in Theatre.
Dawson, C., BA (UBC), MA (Sussex), PhD (Queensland). Canadian and post-colonial literatures.
Evans, D., BA (Toronto), MA, PhD (Rutgers). Nineteenth and twentieth-century American literature.
Gantar, J., BA, MA (Ljubljana), PhD (Toronto), major appointment in Theatre.
Greenfield, B.R., BA (York), MA (McGill), MPhil, PhD (Columbia). Colonial and nineteenth-century American literature.
Irvine, D., BA (UVic), MA (Calgary), PhD (McGill). Canadian literature.
Maitzen, R., BA (UBC), MA, PhD (Cornell). Nineteenth-century literature.
McNeil, D., BA (Concordia), MA (UNB), PhD (McMaster). Restoration and eighteenth-century literature.
Ross, T., BA, MA (Carleton), PhD (Toronto). Eighteenth-century literature and history of criticism.
Stewart, A., BA (Guelph), MA, PhD (Queen's). Twentieth-century literature.
Thompson, J., BA (Western), MA, PhD (Toronto). Romantic literature.
Wright, J., BA, MA, PhD (Western). Nineteenth-century literature.

Assistant Professors

Bennett, L., BA, MA, PhD (Dalhousie), MA (Carleton). Renaissance literature, Rhetoric and Composition
Brittan, A., BA, MA (Toronto), PhD (Pennsylvania). World literature
Cawsey, K., BA (WLU), MPhil (Oxford), PhD (Toronto). Medieval literature.
Enns, A., BA (North Carolina), MA, PhD (Iowa), MA (Hollins). Cultural studies.
Haslam, J., BA, MA (McGill), PhD (Waterloo). Nineteenth and twentieth-century literature.

Adjunct Professors

Bruhm, S., MA (Dal), PhD (McGill); Mount Saint Vincent University
Davies, R., PhD (Wales); Acadia University
Edwards, E., BA, MA (Dal), PhD (Cambridge); University of King's College
Ferns, C., BA, PhD (London); Mount Saint Vincent University
Glowacka, D., MA (Wroclaw), PhD (SUNY); University of King's College
Heffernan, T., BA, MA (Ottawa), PhD (Toronto); Saint Mary's University
Howard, D., BA, BFA, MA, PhD (UBC); Nova Scotia College of Art and Design
Hulan, R., BA (Acadia), MA (Guelph), PhD (McGill); Saint Mary's University
Malton, S., BA (UVic), MA (Ottawa), PhD (Toronto); Saint Mary's University
Monaghan, D., BA, MPhil (Leeds), PhD (Alta); Mount Saint Vincent University
Ó Siadhail, P., BA Hons, PhD (Dublin); Saint Mary's University
Perkin, J.R., BA (Oxford), PhD (Toronto); Saint Mary's University
Smol, A., BA (Concordia), MA, PhD (Queen's); Mount Saint Vincent University
Stanivukovic, G., BA (Yugoslavia), MA, PhD (Belgrade); Saint Mary's University
Stiles, D., AB (Marshall), MA, PhD (Maine); NSAC

Applicants should designate the proposed thesis area at the time of application for admission. The Department will entertain research proposals at the MA level in most areas of British, Canadian, or American literature, and at the PhD level in many of these areas. Nonetheless, applicants for the PhD should take care to consult the Graduate Coordinator of the department concerning its strength, in both resources and personnel, in the field of study in which they propose to specialize.

I. Admission Requirements

Candidates must at a minimum satisfy the general requirements for admission to the Faculty of Graduate Studies as spelled out in Section II in the Faculty of Graduate Studies regulations. Since this department accepts full-time graduate students only if it can fund them, standards are very high, currently an A- or better average in the last two years. Both MA and PhD programs presuppose an acquaintance with English literature of different periods and nationalities. Applicants with other strengths but with limited historical coverage might still be accepted, but required to remedy deficiencies with one or even two of their graduate classes.

Only in exceptional circumstances will persons holding a BA and an MA from Dalhousie be allowed to proceed to a PhD program without study at another institution. If you have a Dalhousie BA and MA and wish to apply to the PhD, please consult the Graduate Coordinator first.

Students are reminded that the pragmatic, departmental deadline for applications is much earlier than the official Faculty of Graduate Studies one of June 30. Students who wish their applications **to be competitive** should **submit them by February 15.** Those who wish to be considered as **candidates for Killam awards must submit complete applications by January 15**. Please consult the departmental Website for full, updated information, including deadline dates and details.

II. Degree Programs

A. Master of Arts (MA)

For minimum time required to complete this program, see Section 1.3.1, page 19, in the Faculty of Graduate Studies regulations.

Class work must include a graduate seminar (half or full-year) in the thesis area; at least one graduate seminar in a field unrelated to the thesis; and additional seminars in English to make up the equivalent of two and a half full-year seminars. Master's students must also complete ENGL 8000, the MA thesis prospectus, usually in the winter semester. With the approval of the Graduate Committee, a graduate class in another department relevant to the candidate's thesis may take the place of one of the additional seminars, and under certain conditions a reading class may take the place of the seminar in the thesis area.

Before graduation all students are required to demonstrate some proficiency in at least one language other than English that is relevant to their studies.

A thesis, equivalent to two classes, is required.

B. Doctor of Philosophy (PhD)

For the minimum time required to complete this program, see Section 1.3.2, page 19, in the Faculty of Graduate Studies regulations.

In the first year, doctoral candidates must take the equivalent of 3 full-year graduate seminars.

Candidates must take a qualifying examination, with written and oral portions, in the field (period and national literature) most germane to their intended thesis. The examination is to be taken no later than May of the second year in the program.

All graduate students in the Department are required to demonstrate some proficiency in at least one language other than English that is relevant to their studies.

Preparation and defence of a thesis are required.

Malcolm Ross Award in Canadian Literature
To be awarded at the discretion of the Department of English for an outstanding MA or PhD thesis in the field of Canadian Literature. McClelland and Stewart, publishers of the New Canadian Library series, have funded the award to honour Malcolm Ross, founding editor of the series and Professor Emeritus in the Department of English.

Malcolm Ross Graduate Scholarship in English
Established by his colleagues and friends in memory of Malcolm Ross, distinguished literary scholar and editor and long-time member of the English Department. A graduate scholarship in the amount of $1,500 to be awarded by the department's Graduate Committee to an outstanding student entering the M.A. program in English.

III. Class Descriptions

Graduate Seminars

Approximately seven full-year seminars or the equivalent are offered each year. Students should consult the departmental Website about which of the following seminars will be offered.

ENGL 5000.03: Directed Readings I.

FORMAT: Individual instruction
RESTRICTION: Students may only register for this class with the written permission of a Faculty member and the Graduate Coordinator.

ENGL 5001.03: Directed Readings II.

FORMAT: Individual instruction
RESTRICTION: Students may only register for this class with the written permission of a Faculty member and the Graduate Coordinator.

ENGL 5002X/Y.06: Selected Readings in English.

NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
FORMAT: Individual instruction
RESTRICTION: Students may only register for this class with the written permission of a Faculty member and the Graduate Coordinator.

ENGL 5110X/Y.06: Middle English Literature.

A study of major and minor works in Middle English, including poetry by Chaucer, Langland, and the Pearl-Poet. We will pay particular attention to language, manuscript transmission and cultural context.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): M. Furrow
FORMAT: Seminar

ENGL 5116.03: Gift and Exchange in Middle English Literature.

This class will consider the symbolic economies of gift and exchange as figured in key Middle English literary texts, particularly in relation to modern theories of the gift. Issues considered will include late feudal exchange, genre-inflected economics, literary production, and the aristocratic gift.
INSTRUCTOR(S): E. Edwards
FORMAT: Seminar

ENGL 5117.03: Medieval Romances.

A study of romances in Middle English, their origins, their context, their genre, their reception, and the ethical issues they were felt to or failed to embody.
INSTRUCTOR(S): M. Furrow
FORMAT: Seminar

ENGL 5118.03: Reading the Canterbury Tales (All of Them)

This class will provide an opportunity to read Chaucer's *Canterbury Tales* closely in its entirety, with a view to establishing over-arching connections, themes and concerns.
INSTRUCTOR(S): E. Edwards
FORMAT: Seminar

ENGL 5130.03: Gender and Sex in Medieval Literature.

This class examines the representation of gender and sex in Medieval literature, with a study of topics such as constructions of gender, the invention of romance and its relation to misogyny, the role of women in literary production, and the representation of various sexualities.
INSTRUCTOR(S): A. Smol
FORMAT: Seminar

ENGL 5131.03: The First Millennium and Beyond.

This class examines Anglo-Saxon views of time, history, and apocalypse and the ways the writers of prose and poetry responded to the age that Anglo-Saxon writers believed themselves to inhabit.
INSTRUCTOR(S): A. Smol
FORMAT: Seminar

ENGL 5135.03: England's Late-Medieval Alliterative Poetry.

This seminar will survey such masterworks of the late-medieval period as *Pearl, Sir Gawain* and *Piers Plowman*, as well as diverse lyrics and short poems, major romance-narratives and cycle-plays. Analysis of the poems' verbal resources, stylistic techniques and topical preoccupations will be conjoined to some questions of codicology and pertinent history. The class will build upon a basic undergraduate acquaintance with the Middle English language and canon, and will offer an introduction to manuscript studies.
INSTRUCTOR(S): M. Furrow
FORMAT: Seminar

ENGL 5226X/Y.06: Re-Imagining Shakespeare.

This class looks at creative re-imaginings of Shakespeare's plays - some modern, some his own; it looks at textual debates over whether different editions of a play should be conflated or isolated; and it looks at the angles of approach developed by various theoretical paradigms. The class will attempt to get at such questions as what is the relation between creative and critical reimaginings, and what constitutes the continuing life of Shakespeare's work?
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): J. Baxter
FORMAT: Seminar

ENGL 5227.03: Re-Imagining the Plot in Selected Shakespearean Tragedies.

Starting with Ben Jonson's Aristotelian account of plot -- "it behoves the action in a tragedy to be let grow, till the necessity ask a conclusion" -- this class explores the ways in which some of Shakespeare's tragedies adhere to or depart from the principles of Aristotle's *Poetics*.
INSTRUCTOR(S): J. Baxter
FORMAT: Seminar

ENGL 5230X/Y.06: Renaissance Poetry and Rhetoric.

The central aim of this class will be to evaluate the achievement of English Poetry during the sixteenth and early seventeenth centuries. We will explore this question primarily through a study of short poems, their relation to the influential rhetorical works, and their relation to each other.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): J. Baxter
FORMAT: Seminar

ENGL 5231.03: Spenser, Shakespeare, Donne: Eros and Chastity.

How do Renaissance poets organize erotic experience? What forms (genres, styles, methods) do their orderings take, and what are their motives (personal, cultural, religious)? We will explore these and related questions by concentrating on selected works by Donne, Shakespeare, and Spenser.
INSTRUCTOR(S): J. Baxter
FORMAT: Seminar

ENGL 5234.03: Professing Poetry in the English Renaissance.

This class examines the emergence of the professional poet in England at the beginning of the 17th Century. What are the demands, the criteria, and the rewards of the profession? How different are the opportunities available to men and to women? The focus will include writers such as Ben Johnson, Aemilia Lanyer, John Donne and Lady Mary Wroth.
INSTRUCTOR(S): J. Baxter
FORMAT: Seminar

ENGL 5235.03: Milton's *Paradise Lost*

This seminar is intended both for students who are familiar with the poem and for those who will be coming to it fo the first time. We will read the poem closely, book by book, and examine the poem in its historical, intellectual, and literary contexts. At the same time, we will consider some exemplars of the major twentieth-century critical approaches to the poem.
INSTRUCTOR(S): L. Bennett
FORMAT: Seminar

ENGL 5237.06: Gender in English Renaissance Drama.

This class will examine plays by Shakespeare and his contemporary dramatists in relation to the shifting and multiple discourses about gender in the sixteenth and early seventeenth centuries. As well as reading dramatic works by Shakespeare, Elizabeth Cary, Thomas Middleton, and John Webster, we will attend to cultural and theatrical sources, and current critical approaches.
INSTRUCTOR(S): C. Luckyj
FORMAT: Seminar

ENGL 5238.03: *Othello* and Its Afterlife.

This class focuses on a single play by Shakespeare as a key site where early modern notions of race, gender and class converge. It begins by interrogating the apparent stability of Shakespeare's text, which exists in alternative authoritative versions (Quarto and Folio) and is always mediated by the conditions of a playhouse in which white males play both women and blacks. We'll aim to unpack the complex, cultural constructions of gender and race with which this play is so deeply concerned by studying a range of contemporary discourses (primary

source material on microfilm) as well as Shakespeare's own *Titus Andronicus*, which anticipates some of *Othello's* preoccupations.
INSTRUCTOR(S): C. Luckyj
FORMAT: Seminar

ENGL 5246.03: The Drama from Marlowe to Ford.

An exploration of the diversity of textual and theatrical practice within the canon (and at the margins) of Renaissance drama. Critical strategies will be pluralistic: both detailed analysis of particular scenes and wide-ranging discussion of cultural issues are encouraged. Playwrights to be studied include Marlowe, Heywood, Beaumont, Jonson, Webster, Middleton, and Ford.
INSTRUCTOR(S): R. Huebert
FORMAT: Seminar

ENGL 5250X/Y.06: Renaissance Dissident Writers.

A study of writers who don't share one or more of the normative Renaissance positions, or who have strong reasons for believing that the established order is set up in such a way as to exclude them. Some authors (Southwell, Winstanley, Eliza, Osborne) will be obscure; others (Marlowe, Donne) canonical.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): R. Huebert
FORMAT: Seminar

ENGL 5258.03: Early Modern Privacy.

An exploration of the development of privacy in early modern culture with reference to texts ranging from canonical poetry (by Donne and Marvell) to discursive life-writing (by Montaigne and Browne) to personal letters and diaries (by Dorothy Osborne and Anne Clifford). Is privacy necessarily the preserve of the privileged? Did puritanism promote or inhibit the development of privacy? Did privacy mean the same thing to women as to men? Questions like these will be offered as a provocation to discussion and further enquiry.
INSTRUCTOR(S): R. Huebert
FORMAT: Seminar

ENGL 5265.03: Writing Women/Women Writing in Early Modern England 1540-1640.

This half-credit class explores the context and range of women's writing in Tudor and Stuart England. Adopting a multidisciplinary approach, we will examine a range of works by and about women, from witchcraft trials and medical treatises, to poems, plays, translations and polemical pamphlets in an attempt to determine the relation of early women writers to their culture. Writers to be studied in depth include Mary Wroth, Elizabeth Cary, and Aemilia Lanyer.
INSTRUCTOR(S): C. Luckyj
FORMAT: Seminar

ENGL 5266.03: Mothers and Maternity in Early Modern England 1580-1670.

This class explores motherhood in the culture and literature of early modern England.
INSTRUCTOR(S): C. Luckyj
FORMAT: Seminar

ENGL 5267.03: Shakespeare's Sister: Lady Mary Wroth.

Mary Wroth, the gifted and prodigious author of a prose romance, sonnet cycle, and pastoral drama, offers us a unique opportunity to study the literary achievements of one who was both (as a member of the Sidney family) heir to cultural privilege and (as an unchaste woman) a marginal and subversive figure. Her work will be studied in the context of early modern notions of gender, class and authorship.
INSTRUCTOR(S): C. Luckyj
FORMAT: Seminar

ENGL 5280.03: The Theory and Practice of Literary Pleasure.

An enquiry into some of the established ways of talking about literary pleasure, with a view to devising new and more persuasive ways of doing so.
INSTRUCTOR(S): R. Huebert
FORMAT: Seminar

ENGL 5306.03: The Restoration Theatre.

This half-credit class traces various aspects of the English stage from 1660 to 1700. In addition to approximately a dozen plays, the class will consider the theatrical milieu of the period, including the audience, casts, and spectacular production techniques. Related political events and theoretical controversies will also be surveyed.
INSTRUCTOR(S): D. McNeil
FORMAT: Seminar

ENGL 5310X/Y.06: Restoration and Augustan Satire.

" . . . a sort of Glass, wherein Beholders do generally discover every body's Face but their Own." Along with such definitions of "Satyr", this seminar examines the major satirical texts and events from 1660 to roughly 1750. Among the topics for discussion will be coffeehouse culture, the popular press, and the battle of the sexes.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): D. McNeil
FORMAT: Seminar

ENGL 5315X/Y.06: The Eighteenth-Century English Novel.

This class is designed to provide a broad survey of the English novel from Behn to Austen. All the major forms will be considered: amatory fiction, the fictional memoir, the adventure narrative, epistolary fiction and the Scarron-like comedy of Henry Fielding. Other subjects that will be considered include the origins of the novel, the novel versus the romance and readership.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): D. McNeil
FORMAT: Seminar

ENGL 5316.03/5317.03: Studies in the Eighteenth-Century English Novel.

This half-credit class is devoted to the study of a special subject in the early English novel (e.g. Desire, the image of America, the comic novel, the rise of the female novelist).
INSTRUCTOR(S): D. McNeil
FORMAT: Seminar

ENGL 5331.03: Eighteenth-Century Constructions of Authorship.

This seminar considers the changing status of literary authorship in eighteenth-century England. Topics for discussion include patronage, plagiarism, literary biography, the advent of copyright, visual and satiric representations of authors, and the professionalization of letters.
INSTRUCTOR(S): T. Ross
FORMAT: Seminar

ENGL 5335.03: Reading Pope and Swift: Satire, Entrapment, Theory.

This class has two aims: to consider the virtues and limitations of reader-response criticism, and to assess the value of this approach in interpreting satiric works by Jonathan Swift and Alexander Pope. Of principal concern is the degree to which satire exerts a rhetorical and affective force upon readers that encourages them to work, to make meanings in negotiating twists and turns in the text, and to revise continually their own assumptions about what they are reading.
INSTRUCTOR(S): T. Ross
FORMAT: Seminar

ENGL 5355.03: Eighteenth-Century Popular Literature and History: An Interdisciplinary Approach.

This half-credit class engages in the interdisciplinary study of popular literature. Various theories of popular culture are considered. Students encounter relevant scholarship outside of literary criticism (e.g., art, legal, and economic history, social psychology, folklore and music) by way of an examination of selected episodes in eighteenth-century English life.
INSTRUCTOR(S): D. McNeil
FORMAT: Seminar

ENGL 5404.03: Ireland and the Geopolitical Imaginary in British and Irish Literature, c. 1750-1850.

This course will examine literary depictions of Ireland from the Romantic century (1750-1850) in light of what William Drennan called in 1799 the "policy of geography." Our focus will be literary texts by British and Irish authors that engage three overlapping geopolitical arenas: the transatlantic, Europe and the British Empire.
INSTRUCTOR(S): J. Wright
FORMAT: Seminar
PREREQUISITE: Admission to Graduate English Program

ENGL 5405X/Y.06: The Wordsworth Circle: The Politics and Poetics of Literary Converse.

A sustained exercise in "intertextual genetics", this class will uncover the dynamics of collaboration, debate and 'joint labor' at work in the production of texts by Coleridge and the two Wordsworth (William and Dorothy), and will consider the implications of this exercise for our ideas of literature: nature of poetry, identity, society and gender which these writers have bequeathed to us.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): J. Thompson
FORMAT: Seminar

ENGL 5406.03: Gothic Narrative as Psychoanalytic Event.

This one-term class addresses a wide range of Gothic texts through a psychoanalytic lens. It looks not only at the theory of repression, but also at the importance of identification, melancholia, and repudiation in the formation of the ego. The psychoanalytic events recorded in or created by the Gothic offer a critique of our culture's strategies of normalizing.
INSTRUCTOR(S): S. Bruhm
FORMAT: Seminar

ENGL 5407.03: Landscape and Loss: Nineteenth-Century Irish Literature.

This class will examine the representation of land - as property, landscape, and foundation of national identity - in nineteenth-century Irish literature with particular attention to the genres of topographical poetry, the "big house" novel, and the gothic, as well as the colonial context which complicated both the material relationship to the land and its cultural representation.
INSTRUCTOR(S): J. Wright
FORMAT: Seminar

ENGL 5410X/Y.06: Innovation and Tradition in Romantic Poetry.

Each of the major Romantic poets experimented with the forms of epic, romance, and drama. This seminar will introduce students to some of these longer works in their entirety, and consider the ways their authors transformed these genres.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): R. Tetreault
FORMAT: Seminar

ENGL 5411X/Y.03/5412X/Y.06: Women and Men in the Romantic Era.

Beginning with a study of the changing roles of women in the Age of Revolution, this seminar will examine how men represented women and how women represented themselves at this time. Connections between gender and genre as well as feminist critiques of Romanticism will guide discussion.
NOTE: Students taking ENGL 5412 must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): R. Tetreault
FORMAT: Seminar

ENGL 5413.03: Dramatic Monologues and the Construction of Poetic Traditions.

This class takes as its starting point some influential "stories" that set out to explain how dramatic first-person poems became "in one form or another the norm" in the post-Romantic poetic tradition. These "stories" range from Robert Langbaum's classic 1957 study, *The Poetry of Experience*: *The Dramatic Monologue in the Modern Literary Tradition*, to Alan Sinfield's *The Dramatic Monologue* (1977), to Isobel Armstrong's reconstruction of the development of the dramatic monologue in *Victorian Poetry: Poetry, Poetics and Politics* (1993).
INSTRUCTOR(S): M. Stone
FORMAT: Seminar

ENGL 5414.03: Romantic Women Writers.

Contributes to ongoing feminist reassessments of "English Romanticism" by surveying key genres and forms to which women made notable contributions (the sonnet, the Jacobin & gothic novel, the heroic epistle) and examining the nature of the influence that writers like Wollstonecraft, Smith, Barbauld, Hemans and Baillie had on their contemporaries and are having on current scholarship.
INSTRUCTOR(S): J. Thompson
FORMAT: Seminar

ENGL 5415X/Y.06: Wordsworth and Coleridge.

The close literary relations between these Romantic authors often followed the class of a dialogue in which they responded to one another in alternating poems. Their disagreements over the locus of ultimate value and the solace of nature will be explored.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): R. Tetreault
FORMAT: Seminar

ENGL 5416.03: Brontë Disseminations.

This class focuses on a close study of works by the Brontës, with particular attention to the ways in which their texts have been disseminated in both high and low culture.
INSTRUCTOR(S): M. Stone
FORMAT: Seminar

ENGL 5417.03: The 1790s: The Revolutionary Decade.

This class focuses on the discourse of the 1790s, a turbulent transitional period in which vigorous debates about the rights of man and the wrongs of woman, the politics of class and race, reshaped literature even as they rocked the foundations of English society. Reading a range of canonical and non-canonical Romantic writers in their contemporary contexts, students will gain new insight into the origins of romanticism, as well as gaining a new perspective on current debates about the politics of literature.
INSTRUCTOR(S): J. Thompson
FORMAT: Seminar

ENGL 5418.03: The Poetics and the Politics of Literary Couplings: The Brownings In Their Cultural Contexts.

Drawing on theories of authorship, literary collaboration, gender and genre, this class studies the poetical interactions and innovations of the Brownings in the contexts of the cultural, social and political movements of the nineteenth century, and the reception practices that have shaped responses to literary couples.
INSTRUCTOR(S): M. Stone
FORMAT: Seminar

ENGL 5419.03: Digital Romanticism & Print Culture: The Case of John Thelwall.

This seminar will explore forms and functions of Romantic-era print culture, and its intersections with other cultural media from a perspective at once historical and practical, by offering students the opportunity to edit the works of the Romantic-era poet, orator, educator, political theorist and speech therapist John Thelwall.
INSTRUCTOR(S): J. Thompson
FORMAT: Seminar
PREREQUISITE: Admission to Graduate English (MA or PhD) program

ENGL 5420.03: Keats and Shelley.

Experiments in longer poetic forms by the younger Romantics will be the focus of this seminar. The literary rivalry between the two poets will help to guide discussion. Their disparate views on political action and on the adequacy of language will be explored.
INSTRUCTOR(S): R. Tetreault
FORMAT: Seminar

ENGL 5421.03: Keats.

Keats' journey from lyric to epic will be the focus of this seminar. Indeterminacy and the quest for meaning in his poems, his representations of women, and the assimilation of contemporary discourses of love in his work are among the topics to be examined.
INSTRUCTOR(S): R. Tetreault
FORMAT: Seminar

ENGL 5422.03: Shelley.

Shelley's journey through epic to drama will be the focus of this seminar. Tensions between skepticism and vision, his representations of women, and the radical social critique evolving in his poetry are among the topics to be examined.
INSTRUCTOR(S): R. Tetreault
FORMAT: Seminar

ENGL 5423.03: Race, Religion, Gender and Nation in Nineteenth-Century Literature.

This study of selected generically mixed British and American nineteenth-century texts investigates the intersections of race, religion, gender and nation. The class gives particular attention to historical connections linking the anti-slavery movement in the United States with British working class activism, the Italian liberation movement, and nineteenth-century Zionism.
INSTRUCTOR(S): M. Stone
FORMAT: Seminar

ENGL 5426.03: The Ethics of Victorian Fiction.

This course examines the Victorian debates about the morality of fiction, about the ethical and philosophical implications of particular narrative choices, and about the social and moral role (real and ideal) of the novel. Readings include selected Victorian novels along with 19th and 20th - century theoretical writings on ethics and fiction.
INSTRUCTOR(S): R. Maitzen
FORMAT: Seminar

ENGL 5445X/Y.06: Subject Formations: Interdisciplinary Theory and the Bildungsroman.

This class brings an interdisciplinary body of theory to bear in studying representative examples of the Bildungsroman or "novel of formation" produced from the nineteenth century to the post-modern period, ranging from *Jane Eyre* to Bharati Mukherjee's *Jasmine*. It draws on generic theories of the novel of development; theories of gender, race and class; theories of the "self" and their transformation into theories of the "subject"; theories of psychological and ethical development; gay and lesbian theory; and postcolonial theories.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): M. Stone
FORMAT: Seminar

ENGL 5450.03: Studies in the Victorian Novel: George Eliot and History.

A study of George Eliot's novels and essays as contributions to 19th-century debates over historiographical styles and standards.
INSTRUCTOR(S): R. Maitzen
FORMAT: Seminar

ENGL 5455.03: Filming Jane Austen.

The merits of various theories of film adaptation will be considered through close reading of three novels by Jane Austen and selected film versions of these novels.
INSTRUCTOR(S): D. Monaghan
FORMAT: Seminar

ENGL 5460.03: The Moral of the Story: Reading in Fiction and Ethics.

This class studies examples of ethical criticism of fiction from the 19th and 20th centuries along with novels which test or exemplify various theoretical or philosophical paradigms. Theorists include E.S. Dallas, G.H. Lewes, George Eliot, Mathew Arnold, Henry James, F.R. Leavis, Wayne Booth, Martha Nussbaum, Cora Diamond, J. Hillis Miller, David Parker and Tobin Siebers; novelists include Jane Austen, Charles Dickens, George Eliot, Henry James, Joseph Conrad and Mark Twain.
INSTRUCTOR(S): R. Maitzen
FORMAT: Seminar

ENGL 5465.03: Victorian Women Writers.

This class looks at fiction, poetry, and non-fiction prose by 19th-century women writers including Charlotte Brontë, George Eliot, Elizabeth Barrett Browning, Elizabeth Gaskell, and Harriet Martineau, considering their works both as part of the vigorous intellectual environment of Victorian Britain and as part of a burgeoning tradition of women's writing.
INSTRUCTOR(S): R. Maitzen
FORMAT: Seminar

ENGL 5518.03: Catholicism and Modern Literature.

This class examines the relationship between Catholicism (Anglo- and Roman) and literature, beginning with the Oxford Movement (1833-45). Texts studied include spiritual autobiographies, novels, and lyric poetry, by authors such as John Henry Newman, Gerard Manley Hopkins, James Joyce, Graham Greene, Thomas Merton, and Mary Gordon.
INSTRUCTOR(S): R. Perkin
FORMAT: Seminar

ENGL 5545.03: George Orwell and the Politics of the Plain Style.

This class examines a wide selection from Orwell's documentaries and other non-fiction, as well as his six novels in addition to the significant predecessors to *Nineteen Eighty-Four* - Yevgeny Zamyatin's *We* and Aldous Huxley's *Brave New World*. We will also evaluate claims recommending and criticizing plainness of literary style.
INSTRUCTOR(S): A. Stewart
FORMAT: Seminar

ENGL 5562.03: Telling the Truth in America: Franklin to Faulkner.

This course will examine the importance of the concept of truth in American literature and culture, and how it is reflected in the writings of a number of writers and thinkers from the Puritans to the twentieth century. Special attention will be given to the works of William Faulkner.
INSTRUCTOR(S): D. Evans
FORMAT: Seminar

ENGL 5614.03: Leonard Cohen: The Siren Song of Literature.

A consideration of Leonard Cohen's poems, songs, and novels and their relationship to the development of Canadian identity and cultural mythologies.
INSTRUCTOR(S): J. A. Wainwright
FORMAT: Seminar
PREREQUISITE: Admission to Graduate English Programms

ENGL 5620X/Y.06: Modern Canadian Fiction.

A consideration of canonical and non-canonical works from the 1920s through the 1990s.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): J.A. Wainwright
FORMAT: Seminar

ENGL 5621.03: The Canadian Canon Revisited.

A consideration of the emergence, value, and contemporary relevance of the standard canon of fiction in modern Canadian literature. Particular attention is given to the shifting relationship between ethics and aesthetics in regard to issues of race, gender and class.
INSTRUCTOR(S): J.A. Wainwright
FORMAT: Seminar

ENGL 5625.03: Studies in Modern Canadian Poetry.

This class studies a selection, which varies from time to time, of major figures in Canadian poetry, from the beginning of the twentieth century to the present day. A mixture of theoretical approaches is encouraged.
INSTRUCTOR(S): Staff
FORMAT: Seminar

ENGL 5628X/Y.06: Modern Canadian Literature: Rewriting History.

An examination of the rewriting of history and the relationship between creative expression and social and political realities in works by Native-Canadians and members of other racial minorities.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): J.A. Wainwright
FORMAT: Seminar

ENGL 5645.03: Intercultural Issues in Canadian Literature.

This class will consider works by several Canadian writers who, through their focus on questions of race, ethnicity, and gender have reinscribed the Canadian cultural landscape and so redefined the politics of cultural experience in Canada.
INSTRUCTOR(S): J.A. Wainwright
FORMAT: Seminar

ENGL 5650.03: Nations Within: The Politics and Poetics of Native American Literature.

Literature by First Nations writers poses a challenge to the ideas of nation and national literature. The study of Native Literature asks us to consider seriously the politics of literary representation and the way this politics is conditioned by literary reception.
INSTRUCTOR(S): R. Hulan
FORMAT: Seminar

ENGL 5660.03: The New Canadian Literature Canon.

This class will examine texts from the new Canadian literary canon that has come into existence over the past twenty-five years through a combination of views and values inherent in academic and popular critical commentary and late twentieth-century perceptions of cultural capital.
INSTRUCTOR(S): J. A. Wainwright
FORMAT: Seminar

ENGL 5670.03: Canadian Editions.

This course will examine ways in which editors of literary texts by English and Native Canadian authors contribute to the construction and interpretation of these texts, mediate translations from oral performance to print, facilitate reconstructions of "corrupted" texts and recoveries of "lost" texts, and chronicle material histories of textual production.
INSTRUCTOR(S): D. Irvine
FORMAT: Seminar

ENGL 5675.03: Editing Canadian Modernism.

Beginning with the McGill Movement in the 1920s, this course will follow the activities of poets and editors of modernist little magazines in Canada through the mid-1950s.
INSTRUCTOR(S): D. Irvine
FORMAT: Seminar
PREREQUISITE: Admission to Graduate English (MA or PhD) program

ENGL 5680.03: Writing in Canadian: Globalization and Contemporary Canadian Literature.

Beginning with an introduction to debates about globalization and literary studies, this class explores the tension between the local and the global in contemporary Canadian literature. In an attempt to understand the relationship between cultural identity, nationalism, and literature in Canada, we also consider the popular scholarly reception of books on our reading list.
INSTRUCTOR(S): C. Dawson
FORMAT: Seminar

ENGL 5700.03: South African Literature in a Century of Struggle.

At the center of all South African anti-apartheid writing, from the manifesto to the poem, is the following question: what is the relationship between writing and fighting? This class will explore the ways in which ethical and political relations have been imagined, revised, and represented in twentieth-century South Africa.
INSTRUCTOR(S): A. Brittan
FORMAT: Seminar

ENGL 5805.03: Walt Whitman and Emily Dickinson.

A close study of the works and lives of two great American poets of the nineteenth century.
INSTRUCTOR(S): B. Greenfield
FORMAT: Seminar

ENGL 5811.03: American Lives.

Drawing on a wide range of experiences and texts from the eighteenth and nineteenth centuries, this class is an exploration of possible lives, of the give and take between literary imagination and the other determining forces of life.
INSTRUCTOR(S): B. Greenfield
FORMAT: Seminar

ENGL 5812.03: Ideas of the Western.

This course will deal with representations of the American West in fiction and film, exploring the various cultural, social, and political functions that those representations have served.
INSTRUCTOR(S): D. Evans
FORMAT: Seminar
PREREQUISITE: Admission to Graduate (MA or PhD) program

ENGL 5813.03: Literature of the American Prison.

This course will examine literary depictions of the prison in the US, paying particular attention to writings by prisoners. The course will also survey the modern prison's larger relations to literature, from the eighteenth century and sensationalist literature through to the current period of mass imprisonment and contemporary political autobiography.
INSTRUCTOR(S): J. Haslam
FORMAT: Seminar
PREREQUISITE: Admission to Graduate English (MA or PhD) program

ENGL 5814.03: The Afterlife of Henry James.

This course approaches the fiction of Henry James by way of its reception – history. A representative of James's fiction will be studied, along with criticism of that fiction, biographies of James, film adaptations, and novels about James or responding to works by him.
INSTRUCTOR(S): R. Perkin
FORMAT: Seminar

ENGL 5815X/Y.06/5817.03: American Travel/American Literature.

This class explores the connections between the rich archive of travel reportage from the eighteenth and nineteenth centuries and American works of fiction and poetry during the same period. An hypothesis of the class is that travel genres exerted a profound influence on the American literary imagination of the nineteenth century.
NOTE: Students taking ENGL 5815 must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): B. Greenfield
FORMAT: Seminar

ENGL 5828.03: Ralph Ellison's America.

This half-year class will consider the vision of America that emerges from the work of Ralph Ellison. Perhaps more specifically, the class juxtaposes Ellison's vision with the national image which has taken on the status of an originary myth. We will read *Invisible Man* and a selection of Ellison's essays, as well as texts which will help contextualize Ellison's ongoing discussion of the place of African Americans in the larger social and political landscape of the United States.
INSTRUCTOR(S): A. Stewart
FORMAT: Seminar

ENGL 5829.03: Turning a Lens Into a Mirror: The Sterotype in Ellison and Everett.

The stereotype can be a damaging trope, used to belittle, patronize, or praise. Stereotypes tend to be used against others in order to exert power over those others, whether the stereotype is "positive" or "negative." This class will examine how two novelists critique notions of stereotype.
INSTRUCTOR(S): A. Stewart
FORMAT: Seminar

ENGL 5830.03: Reading American Modernism.

This class looks at the initial reception of some central works of High Modernism as well as works that have been considered to be at its fringes. In doing so, it considers questions of how the canon was formed.
INSTRUCTOR(S): L. Diepeveen
FORMAT: Seminar

ENGL 5835.03: Finding a Center: Making Literary History in Contemporary American Poetry.

Selecting from a wide range of poetic practices, this class considers the work of five or six contemporary poets. It does so in order to explore the contesting aesthetic principles critics and poets are currently using to construct versions of contemporary poetic history.
INSTRUCTOR(S): L. Diepeveen
FORMAT: Seminar

ENGL 5840X/Y.06: Literary Talk: How Modernism was Invented.

This class discusses the variety of forms and strategies that were used to invent Anglo-American Modernism as a recognizable moment in literary history; that is, as a literary period, with its own techniques, central and marginal authors, paradigmatic stories, and boundaries.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): L. Diepeveen
FORMAT: Seminar

ENGL 5845.03: Forms of Modern Literary Production.

This class examines the context in which the texts of modernism were produced. It considers the roles of little magazines, anthologies, manifestos, and the rise of literary criticism as a profession.
INSTRUCTOR(S): L. Diepeveen
FORMAT: Seminar

ENGL 5850.03: Aesthetic Scandals of the Twentieth Century.

This course is based on some major aesthetic scandals of the twentieth century- literary, visual, and acoustic. The seminar will explore such things as recurrent patterns of behavior in scandals, formalism as a technique for dissipating scandal, and the relation of scandal to canon formation and cultural capital.
INSTRUCTOR(S): L. Diepeveen
FORMAT: Seminar

ENGL 5875.03: Twentieth-Century African-American Intellectual Debate.

This class offers a selection of the diversity of voices emanating from that American ethno-cultural field still called "the black community." What is at stake in such a term at a time when the diversity of opinion among African-Americans is public and vast? Why is the label of "conservatism" seen as an accusation among many African-American thinkers? Do concerns with group solidarity overmatch, interfere with, or aid advancement of the group as a whole? The writings considered will provoke students to pose their own speculations on the issues raised.
INSTRUCTOR(S): A. Stewart
FORMAT: Seminar

ENGL 5911.03: Between Literature and Philosophy.

In this class we will consider the relations between philosophy and literature through the lens of several texts that seem to cross their respective discursive boundaries. In the words of philosopher Philippe Lacoue-Labarthe, philosophy has been defining itself against literature, insisting that it conveys truths that are absolute in nature and thus independent of its written medium. The theoretical texts we will read in the course, by authors such as Platto, Kierkegaard, Nietzsche, Blanchot, de Man, Derrida, Cixous and Irrigaray, however, explore the texture of language and reveal philosophy's dependence on literary devices. On the other hand, we will examine the texts that belong to the domain of literature yet engage in a philosophical reflection, such as Kafka's parables, poetry by Waldrop and Celan, and novels by Michel Tournier and Jeanette Winterson.
INSTRUCTOR(S): D. Glowacka
FORMAT: Seminar
PREREQUISITE: Admission to raduate English (MA or PhD) program

ENGL 5917.03: Critical Theory: The Ethical Turn.

Under fire for a lack of commitment in the 1980s, critical theory (postmodernism, post structuralism, and deconstruction) takes an 'ethical turn' in 1990s to explore issues of social and political justice and to interrogate notions of identity, politics, and the social construction of gender. This class attempts to study some of these innovative critical interventions and to re-enact them in the classroom.
INSTRUCTOR(S): D. Glowacka, A. Brittan
FORMAT: Seminar

ENGL 5926.03: Travelling East.

This course will focus on travel writing about the Orient. We will consider such things as the historical nuances of orientalism, the "Eastern" question, the gender of the writer, the representation of the harem, the politics of the (un)veiling of women, and the genre of travel writing.
INSTRUCTOR(S): T. Heffernan
FORMAT: Seminar

ENGL 5928X/Y.06: Literary Couples and Collaborators.

This team-taught class questions paradigms of the "solitary genius" by approaching the works of literary couples and collaborators in conjunction with one another. It considers the dynamics of interpersonal and intertextual relationships; the differing trajectories of the "family romance"; mutual differences and difficulties with the muse; mentoring versus "mothering" a partner's creativity; anxieties of authorship and of mutual influence; sexual/textual tensions; playing the role of an implied, ideal or actual reader/listener; and revising or editing a partner's works as a form of co-authorship and/or co-option.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): J. Thompson, M. Stone
FORMAT: Seminar

ENGL 5935.03: Canonicity.

This class is intended as an experiment in "teaching the conflicts" that are currently vexing the profession of English literature about the nature of literary value and the "canon". Readings for the class will include "classic" statements on value by Hume, Johnson, and Arnold, and more recent position papers on the theory of canonicity by such critics as Harold Bloom, Frank Kermode, Pierre Bourdieu, and others. Among the questions that may be addressed are the following: is aesthetic value enduring or relative to specific social formations? What do we mean when we say a work is good or a classic? Is there a test of time and should we abide by it? Is value something that inheres in a text or something assigned to it? How are literary canons formed and for what purpose? What is the relation between the canon and the curriculum?
INSTRUCTOR(S): T. Ross
FORMAT: Seminar

ENGL 5940X/Y.06: , 5941.03: Queer Theory.

An examination of recent developments in lesbian and gay cultural criticism. Topics to be covered may include identity politics, camp, psychoanalytic theories of identification, pornography, and the representations of AIDS.
INSTRUCTOR(S): S. Bruhm
FORMAT: Seminar

ENGL 5945.03: Representations of Slavery: Race, Writing and Gender.

This class focuses on narratives of and about slavery written over three centuries in a range of genres on both sides of the Atlantic. The selection of texts is designed to foreground the syncretic hybridity of cultural traditions and to problematize binary oppositions between black and white, and female and male authors, between history and literature, and between traditional and postmodern works.
INSTRUCTOR(S): M. Stone
FORMAT: Seminar

ENGL 5950.03: Literary Labours.

This seminar will address English-language working-class literature and culture in early twentieth-century North America. Readings will include the stories and histories of literary labour- not only of those who define themselves as members of the working class but also of those who work alongside them as poets, songwriters, journalists, dramatists, activists, essayists, short-story writers, and novelists.
INSTRUCTOR(S): D. Irvine
FORMAT: Seminar

ENGL 5996.03: Canadian Multicultural Fictions: Ethnicity, Race and Reading.

Drawing on a wide range of theoretical writing about identity formation, ethnicity, race, diaspora, and migration, this course aims to develop a nuanced understanding of multiculturalism as it is represented by a number of contemporary Canadian writers whose narratives explore its pleasures and discontents.
INSTRUCTOR(S): C. Dawson
FORMAT: Seminar

ENGL 8000.00: English MA Thesis Prospectus.

This registers the students' involvement during the winter term of their academic year-in-residence in developing the thesis prospectus for the MA and then in reading towards the thesis.
FORMAT: Directed Research

ENGL 9000.00: MA Thesis.

ENGL 9530.00: PhD Thesis.

Environmental Engineering

Location: Faculty of Engineering
Graduate Studies and Research
Dalhousie University, Sexton Campus
P.O. Box 1000
Halifax, NS B3J 2X4
Telephone: (902) 494-1288
Email: gsr@dal.ca
Website: http://www.registrar.dal.ca/calendar/gr/ENVE.htm

Director

Hill, J., BSc, MSc, PhD, environmental geology, acid rock management

Faculty

Al Taweel, A.M., BSc, MSc, PhD, PEng., multi-phase processing, pollution prevention
Ben Abdallah, N., BSc, MASc, PhD, PEng, PAg., solar energy, thermal energy storage, environmental control & air quality
Coté, R., BSc, MSc, industrial ecology, management of chemical hazards and wastes
Duinker, P., BSAgr, MES, PhD, environmental impact assessment, climate change and forests
Fels, M., BEng, Meng, PhD, PEng, air pollution control, energy storage
Flint, I., BSc, BASc, MASc, PhD, soil remediation, hydrocarbon separation, heavy metal removal
Gagnon, G.A., BScE, PhD, PEng, water quality, waste treatment
Ghaly, A. E., BSc, MSc, PhD, PEng., waste management and utilization, bioremediation, biomass energy, environmental biotechnology
Gordon, R.J., BSc, MSc, PhD, bio-waste management, constructed wetlands systems, climate change
Hansen, D., BScE,MScE, PhD, PEng, hydrology, hydrogeology
Hart, W.C., BSc, MA, PhD, environmental assessment, biogeochemistry, watershed management
Hughes, F.L., BSc, MSc, PhD, climate change policy, sustainable transportation, renewable energy
Islam, R., DipIng, MSc, PhD, environmental impact of oil and gas production, greenhouse gas mitigation
Jamieson, R., BEng, MASc, PhD, watersheds, contaminant transport, ecological engineering
Lake, C., BEng, PhD, geotechnical and geoenvironmental engineering
Little, T., BScEng, MEng, PhD, wind energy, electric energy storage systems
Liu, L., BSc, MScE, PhD, pollution control, assessment, geoenvironmental engineering
Madani, S.A., BSc, MSc, PhD, soil and water conservation, water quality
Pelot, R., BSc, MSc, PhD, risk analysis, operations research
Rockwell, M., BEng, MEng, PhD, PEng, mine waste management
Satish, M.G., BSc, BECivEng, MEng, PhD, PEng, water quality modeling, groundwater transport
Stratton, G.W., BSc, MSc, PhD, environmental microbiology, biodegradation of environmental toxicants, industrial wastes and pesticides
VanderZwaag, D., BA, MDiv, JD, LLM, PhD, environmental law
Walsh, M., BEng, MEng, PhD, water treatment, membrane processes, water reuse, chemical conditioning
Watts, K.C., BSA, MSc, PhD, biodiesel, alternative energy.

I. Introduction

This program is comprised of faculty from different departments in the Faculty of Engineering who have research interests in the multidisciplinary field of environmental engineering. Graduate education in environmental engineering builds upon a strong foundation in science and engineering principles which are applied to the solution of important problems related to sustainable utilization of natural resources and protection of the environment.

Master of Engineering (MEng.) and Master of Applied Science (M.A.Sc.) degree programs are available for students interested in obtaining a graduate degree in Environmental Engineering. It is also possible to pursue a Ph.D. degree in engineering related to the environment. Within these degree programs, students have a wide choice of classes and research topics to meet their particular interests and needs. A wide selection of graduate level courses in the areas of energy and environment, soil and water quality management, waste management and remediation, pollution control and environmental assessment studies are available in the Faculty of Engineering and other faculties offering graduate studies at Dalhousie University.

Graduate students can also conduct field research studies on soil erosion, bio-chemical transport phenomena, engineered wetlands, bio-waste composting and bioremediation at the Bio-Environmental Engineering Centre jointly administered by the Faculty of Engineering and the Nova Scotia Agricultural College and located in Truro, Nova Scotia.

Facilities

Several modern, well-instrumented specialized laboratories in environmental engineering are housed in participating departments in the Faculty of Engineering. These specialized research laboratories include: biochemical analysis, water quality, waste treatment, soil erosion, environmental measurements and hydraulics.

Graduate students also have access to excellent research facilities in the Bio-Environmental Engineering Centre (BEEC), the Centre for Water Resource Studies (CWRS) and the Canadian Residential Energy End-use Data and Analysis Centre (CREEDAC).

Graduate students have the technical support of highly-qualified and experienced research support technicians and technologists in bio-chemical analysis, measurement and control systems, and design and manufacture of specialized research equipment.

II. Degrees

Master of Applied Science (MASc)

Refer to the **Engineering** section in this calendar for admissions requirements, academic regulations, program duration and other relevant information.

Master of Engineering (MEng)

Refer to the **Engineering** section in this calendar for admissions requirements, academic regulations, program duration and other relevant information.

Doctor of Philosophy (PhD)

The Ph.D. in Engineering with specialization in Environmental Engineering is offered by several Engineering Departments. Consult the **Engineering** section or the specific engineering department in this calendar.

III. Application Forms and Procedure

Application forms may be obtained from (a) the Office of the Registrar, (b) the Office of Graduate Studies and Research, Faculty of Engineering, Dalhousie University, Halifax, Nova Scotia B3J 2X4 or (c) through the University's website on the internet.

Application forms, transcripts, two letters of reference and a statement on area of research interest should be sent to the Faculty of Engineering, Office of Graduate Studies and Research.

IV. Courses Offered

ENVE 6000.03: Directed Studies in Environmental Engineering.

This class is available to graduate students enrolled in a Masters program in Environmental Engineering wishing to gain knowledge in a specific

area for which no graduate class is offered. Students are assigned an advisor and are required to produce a formal report at the end of the class. FORMAT: Self-study and directed research

ENVE 6800.03: Graduate Seminar in Environmental Engineering I.

All graduate students in Environmental Engineering are required to present their research findings in a 30 minute oral presentation and written report.

ENVE 9000.00: Master of Engineering Project.

ENVE 9001.00: Master of Applied Science Thesis.

For Further Information Contact

Graduate Admissions

Environmental Engineering Program
Dalhousie University, Sexton Campus
P.O. Box 1000
Halifax, NS B3J 2X4
Canada
Telephone: (902)494-1288
Fax: (902)494-3149
Email: gsr@dal.ca
Web: http://www.dal.ca/~engiwww/

Environmental Studies

Location: Kenneth C. Rowe Management Bldg
6100 University Ave, Suite 5010
Halifax, NS B3H 3J5
Telephone: (902) 494-3632
Fax: (902) 494-3728
Website: http://sres.management.dal.ca

Resource and Environmental Studies

Director of School

Beazley, K.F. BLA (Guelph), MA (Waterloo), PhD (Dal)

Academic Program Coordinator (changes annually)

Tyedmers, P.H., BSc (Hons) (Waterloo), LLB, PhD (UBC)

Professors

Cohen, F., BA, MEd (Harvard), PhD (Minn). Native people & natural resources; fisheries co-management; indigenous people's rights.

Côté, R.P., BSc (Loyola), MSc (Memorial). Industrial ecology; marine environmental protection strategies; management of chemical hazards & wastes; environmental policy

Duinker, P., BScAgr (Guelph), MES (Dal), PhD (UNB). Forest management and policy, environmental impact assessment, sustainable development, sustainability indicators, public participation and conflict resolution, forest biodiversity assessment, wildlife habitat analysis, climate change and forests, public opinions on environment and natural resources

Willison, J.H.M., PhD (Nottingham), joint appointment with Biology. Nature conservation policy and practice; marine biodiversity, deep sea corals, protected areas and community involvement.

Associate Professors

Beazley, K.F., BLA (Guelph), MA (Waterloo), PhD (Dal), Biodiversity conservation; protected area system design; ecosystem and protected area management; focal species; landscape ecology and conservation biology; environmental ethics.

Tyedmers, P. H., BSc (hons) (Waterloo), LLB, PhD (UBC), Academic Program Coordinator. Ecological economics, biophysical accounting, sustainable development, fisheries and aquaculture.

Assistant Professor

Bush, P., BA (Hons) (Laurentian), MScF (Lakehead), PhD (U Western Ontario), GIS, remote sensing, GPS; wildlife habitat, landscape ecology, bird conservation, old-growth forests, green mapping.

Cross-Appointed Professors

Adl, S., BSc, MSc, PhD (UBC), major appointment in Biology. Biology of microorganisms; ecology of decomposition; soil and sediment nutrient cycling; comparative cell biology.

Apostle, R., BA (SFU), MA, PhD (Calif, Berkeley), major appointment in Sociology and Social Anthropology. Fisheries social science; comparative analysis of small-scale fisheries.

Cross, M.L., AA (Dawson College), BA (Montana), MA (SFU), PhD (Texas A&M), major appointment in Economics. Economics of fisheries management; history of economic thought.

Doyle-Bedwell, P., BA , LLB (Dal). Aboriginal women and justice, environmental issues and aboriginal interests in land, mi'kmaq people and health.

Gagnon, G., BScE (Guelph), PhD (Waterloo), PEng, major appointment in Civil Engineering.

Glazebrook, P., BA (Alberta), MA, PhD (Toronto), major appointment in Philosophy. Ethics, environmental philosophy, philosophy of science,

Heidegger. (http:www.dal.ca/~philwww/hmpage/faculty/glazebrook.htm).

Hughes, L.K., BSc (Carleton), MSc, PhD (Newcastle upon Tyne), major appointment in Electrical and Computer Engineering. Greenhouse gas studies; Halifax transportation; and sustainable energy systems. (http://www.dal.ca/~lhughes2).

VanderZwaag, D., BA (Calvin), MDiv (Princeton), JD (Arkansas), LLM (Dal), major appointment in Law. Environmental law reform, Canadian ocean law and policy, Arctic marine transportation.

Wright, T.S., Bach. Environmental Studies (Waterloo), MES (Dal), PhD (Alberta), major appointment in Faculty of Science Undergraduate Environmental Programs. Environmental sustainability in higher education; indicators of environmental sustainability; institutional environmental change; environmental education (particularly applying experiential and transformative learning theories).

Adjunct Professors

Bissix, G., BSc, MSc (Univ. Oregon), PhD (Univ. of London, England), Acadia University

Boxall, J., BA, BEd (SMU), MA (Dal), Dalhousie University Libraries.

Brazner, J., BSc (Wisconsin), MS (Syracuse), PhD (Wisconsin)

Charles, A.T., BSc (Carleton), PhD (UBC), Saint Mary's University

Colville, D., BSc (Acadia), MES (Dal), Centre for Geographic Sciences (COGS)

Duerden, C., BSc, PhD (Dal), Duerden & Keane Consultants Inc.

Gordon, R.J., BSc, MSc (McGill), PhD (Guelph), Nova Scotia Agricultural College

Hanson, A., BSc (Mount Allison University), MSc, PhD (Western Ontario), Canadian Wildlife Services - Atlantic Region

Harper, K., BA (Middlebury College), MSc, PhD (Alberta), Environmental Programs, Faculty of Science, Dalhousie Univ.

Herman, T., MSc, PhD (Alta), Acadia University

Hermanutz, L., PhD (Western Ontario), Memorial University

Hildebrand, L., BSc, Marine Biology (Honours), MES, (Dal), PhD (Candidate) (University of Wales). Environment Canada

Keane, S., BSc (StFX), MEng (Western Ontario), Duerden & Keane Consultants Inc.

Kostylev, V., MSc (Odessa University-Ukraine), PhD (Gothenburg University-Sweden), Natural Resources Canada

Labor, P., BSc (Lakehead), MA (Trent), Nova Scotia Department of Environment and Labour.

Laroque, C., BSc (Saskatchewan), MSc, PhD (Victoria), Mount Allison University

Moore, C., BSc (Guelph), MSc (Concordia), Intrinsik Environmental Sciences Inc.

Newkirk, G.E., BSc (Rutgers), PhD (Duke)

Rudd, M., BSc (UBC), MSc (UBC), PhD (Wageningen University), Sir Wilfred Grenfell College, Memorial University

Starzomski, B., BSc (St. FX), MSc (Acadia), PhD (UBC), Post-doc SRES, Dalhousie University

Vasseur, L., BSc (Sherbrooke), MSc (Quebec), PhD (Queen's), Laurentian University

Vigerstad, T., MSc, PhD (Rhode Island), Environmental Solutions, Cunningham Lindsey

Walters, B.B., BSc (UBC), MES (Dal), PhD (Rutgers), Mount Allison University

Warner, A., BSc (Brown's), MA (Dal), BEd, PhD (Dal), Acadia University

Wells, P.G., BSc (McGill), MSc (Toronto), PhD (Guelph)

Wood, K.S., BA, MA (Oregon)

Yiridoe, E., BSc (Univ Science & Tech Ghana), MSc, PhD (Guelph), Nova Scotia Agricultural College

Research Associates

Barchard, W., BSc, MSc (Guelph), Environment Canada

Beach, H., BA (hons) (Simon Fraser), MSc (McGill), Parks Canada

Chute, J., BA (Dal), MA (MUN), MA (Toronto), PhD (McMaster)

Lickers, H., BSc (Trent), Mohawk Council of Akwesasne

MacMillan, J., BSc (PEI), MSc (Acadia), Nova Scotia Department of Agriculture and Fisheries.

The School is the centre for environmental scholarship and research at Dalhousie. It is a leading institution in environmental management and capacity building in Canada and abroad.

At the core of the School is an interdisciplinary teaching and research program emphasizing rigorous inquiry and ethical practice as the foundation of responsible environmental and resource management. Efforts are devoted to addressing causes rather than symptoms and learning to predict change. The School offers two Master's programs. One is a 2-year Master of Environmental Studies (MES) degree which includes class work and a thesis. The other is a 16-month Master of Resource and Environmental Management (MREM) degree involving class work and an internship practicum.

In addition to working partnerships within the Faculty of Management, SRES contributes to many other programs and institutes on the Dalhousie campus. The School also collaborates with other institutions such as the Nova Scotia Agricultural College. The School, through its many teaching, research and community service initiatives, strengthens the University's capacity in resource and environmental studies.

I. Admission Requirements

As established by the Faculty of Graduate Studies, the entrance requirement for both degrees is an Honours Bachelor Degree or the equivalent of honours with at least a B average (3.0 GPA) from a university recognised by the Senate of Dalhousie University. A four-year Baccalaureate degree may be considered as the equivalent of honours if there is significant evidence of independent research capacity.

Deadline for completed applications is February 1.

II. Program Duration

The MES is designed as a two-year degree, which includes class work and a thesis. This means that a student is expected to finish within 24 months, and must pay full fees for two years. If thesis work extends beyond the end of the second year, the student can register as a "continuing or thesis-only student" for which lower fees are assessed. A student admitted to a two-year, full-time program must complete the program within five years. In exceptional circumstances, the School can request an extension to that time.

The MREM is designed as a 16-month program, which includes class work and an internship or project undertaken over a four-month period in the third or summer semester. The MREM is designed for those seeking a professional career or who are already in the workforce and are looking to upgrade their skills and credentials.

A. The Master of Environmental Studies (MES)

For most students, the minimum program will occupy two calendar years (24 months). The minimum requirement is eight (8) half-credits and a thesis.

The program is designed to broaden a student's perspective on natural resource and environmental issues while strengthening their research capabilities. Class work beyond the minimum load may be suggested in consultation with faculty advisor/supervisor.

The eight half credits are made up as follows:

Class Requirements:

- MGMT 5000.03: Management without Borders - a seminar class taken during the first year of study
- ENVI 5035.03/5007.03: Research Methods I and II taken in the first year of study
- ENVI 5009.06: The Graduate Seminar - all MES students are expected to attend and participate, although only students in the second year of their MES program are required to enroll.
- Thesis

Elective Classes:
Students can select a minimum of three electives in consultation with faculty advisor/supervisor. Several elective classes at the School are likely to be offered only every second year. Students are encouraged to consult with faculty on class availability. Classes that may be of particular interest are:

- ENVI 5001.03: Environmental Assessment
- ENVI 5002.03: Joint Project
- ENVI 5031.03: Environmental/Ecological Economics
- ENVI 5039.03: Indigenous Peoples and Natural Resource Management
- ENVI 5041.03: Environmental Education
- ENVI 5047.03: Protected Areas Management
- ENVI 5205.03: Resource and Environmental Law
- ENVI 5480.03: Environmental Ethics

B. Master of Resource and Environmental Management (MREM)

In September 2004, a new degree was launched that involves intensive coursework and an applied internship during a 16-month period. The Master of Resource and Environmental Management (MREM) will graduate highly skilled professionals with the problem-solving tools and scientific (social and biophysical) understanding to create innovative solutions to resource and environmental issues.

The program's goal is to produce graduates who can confidently and independently address both the biophysical and sociopolitical dimensions of resource and environmental problems. The MREM degree is an advanced "professional" degree aimed at management and practical problem-solving.

The program design can take much inspiration from the characterization of sustainable development of natural resources and environment provided by Kai Lee in his 1993 book entitled "Compass and Gyroscope: Integrating Science and Politics for the Environment." He argued that the "compass" for sustainable development is appropriately provided by the science of adaptive management, and the "gyroscope" by the politics of principled and bounded negotiations.

The MREM is designed as a 16-month program involving three class-work and one internship terms. The internship will be undertaken during the summer months. The minimum class requirement is 13 half credits.THIS INCLUDES THE INTERNSHIP.
The elements of the MREM Program are:

Term One
Required classes:

- MGMT 5000.03: Management without Borders
- ENVI 5504.03: Management of Resources and the Environment
- ENVI 5507.03: Environmental Informatics

Plus one elective from a cognate discipline.

Term Two
Required classes:

- ENVI 5505.03: Biophysical Dimensions of Resource and Environmental Management
- ENVI 5500.03: Sociopolitical Dimensions of Resource and Environmental Management
- ENVI 5205.03: Law/Policy for Resource and Environmental Management

Plus one elective from a cognate discipline.

Term Three

- ENVI 5501.03: Resource and Environmental Management Internship

Term Four
Required classes:

- ENVI 5508.03: MREM Project Report

Plus three electives from cognate disciplines.

At least one elective of the five must be taken from classes offered in the Schools of Public Administration, Business Administration, Information Management, or from the Marine Affairs Program.

C. Master of Resource and Environmental Studies/ Master of Library and Information Studies (MREM/ MLIS)

This program leading to the combined degrees Master of Resource and Environmental Studies and Master of Library and Information Studies is pending approval. For further information contact the MREM Program Coordinator and/or the MLIS Graduate Coordinator. Once approved, further information will be found on the School for Resource and Environmental Studies website and the School of Information Management website.

III. Classes Offered

All classes except ENVI 5002.03, ENVI 5003.03, ENVI 5007.03, ENVI 5009.03, ENVI 5035.03, ENVI 5501.03, ENVI 5508.03 and ENVI 9000.00 are open to students in other programs by permission of the instructor. Please note that not all classes are offered each year; class content may also vary from year to year. Please consult the department.

ENVI 5001.03: Environmental Assessment.

Students explore all aspects of environmental assessment (EA), with a focus on EA processes in Canada. The class examines professional practice in scientific, procedural and political dimensions. Current cases are studied opportunistically. Students learn the materials through case studies, seminars, group projects and research papers.
INSTRUCTOR(S): P. Duinker

ENVI 5002.03: Environmental Studies Joint Project.

In this class, students work together as an interdisciplinary team on a project which the group selects and carries out in consultation with the class instructor. Some of the projects undertaken by student teams are as follows:
Visitor Use of Long Lake Provincial Park (2001)
Pollution and Coastal Zone Management: A Case Study of Shellfish Bed Closures in St. Margaret's Bay, NS (2003)
Coffee Karma: An Experience in Global Trade, Fair Trade and Coffee (2004)
Eating for a Better World (2004)
Renewable Energy Promotion in Atlantic Canada (2005)

ENVI 5003.03: Emerging Issues in Sustainability.

A diversity of emerging ethical, ecological and social-economic issues related to global sustainability are critically analyzed through a mix of lectures, seminars and discussions. Issues include challenges around equity, earth's carrying capacity, climate change, energy sources, corporate responsibility, biodiversity losses, population growth, consumption and food security, and renewable natural resources.
INSTRUCTOR(S): Willison, M.
FORMAT: Lecture, seminar and discussion
RESTRICTION: Graduate student

ENVI 5007.03: Research Methods II.

Before MES students embark on their thesis research, they need to gain greater depth and breadth in interdisciplinary research concepts and the variety of considerations in research design. While Research Methods I provides the conceptual foundation of the research enterprise and the development of the thesis topic, Research Methods II provides instruction on research design and practical guidance on tools and techniques appropriate for specific MES thesis topics. The goal of the class is to assist each student to develop a full thesis proposal for presentation and discussion by the end of the term.
INSTRUCTOR(S): F. Cohen
INSTRUCTOR(S): M. Willison

ENVI 5009X/Y.06: Graduate Seminar.

Through student delivered seminars, this course will assist graduate students work through difficult theoretical or methodological challenges related to their research and help them hone skills as presenters and discussants. Along the way, students will be exposed to emerging issues and findings across a range of contemporary areas of enquiry.

NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): P. Tyedmers

ENVI 5010.03: Introduction to Environmental and Occupational Health.

This class will introduce students to many of the principles and concepts underlying environmental and occupational health, focusing on human health. It will review the nature of a variety of agents, including chemical, physical, biological, ergonomic and radiation hazards, how these agents are dispersed and transformed in the environment, the pathways of human exposure to these agents, and characterization of the health effects resulting from exposure. It will present methods for evaluating and controlling hazards, including occupational hygiene evaluation techniques and risk assessment models used in environmental settings. A number of case studies will be covered in detail, including indoor air quality, heavy metals exposure, and organic dust in workplace environments. Special topics will include risk communication and health promotion in the workplace. The class will conclude with a summary of legislative initiatives and standards which have been implemented to protect human health and an evaluation of their effectiveness.
INSTRUCTOR(S): J. Guernsey
CROSS-LISTING: CH&E 6001.03

ENVI 5021.03: Fisheries Management.

This interdisciplinary course focuses on the theory and practice of fishery management, with emphasis on Sustainable Fishery Systems. It will address the structure and dynamics of fisheries, and key themes in managing fisheries for sustainability and resilience, through class seminars and discussion, as well as attendance at related fisheries and coastal events.
INSTRUCTOR(S): T. Charles
CROSS-LISTING: MARA 5021.03

ENVI 5031.03: Economics for Resource and Environmental Management.

This class is designed as a one term introduction to economics for graduate students who do not have any or limited undergraduate economics training. The class is made up of three parts which operate parallel to one another through the term. The first part provides a brief but intense guided tour of economics. This forms the basis for studying applications of economic analysis to environmental issues.
The second part focuses on key topics in environmental economics, including among others:

- the sustainable economy
- theory of market failure, public goods and externalities
- environmentalist critiques of economic thinking
- environmental and natural resource accounting
- economic valuation of the environment
- economic instruments and pollution control
- time in economic/environmental analysis
- economics and environmental management

The final part explores new directions in the field. This focuses mainly on the movement away from a separate "environmental economics" towards a new discipline which better integrates environmental and economic analysis; namely the field of "ecological economics".
The class is open to students in other parts of the University who are interested in economy and environment, and do not have a background in economics.
INSTRUCTOR(S): P. Tyedmers

ENVI 5035.03: Research Methods in Resource and Environmental Studies.

This course focuses on research frameworks, formulation, and design in resource and environmental studies. It offers an overview appropriate for students from diverse disciplines and for students currently developing interdisciplinary approaches. Texts and readings provide guidance and serve as resources for development of MES thesis topics. Class discussion, guest speakers, videos, and practical exercises will also be used.
COURSE OBJECTIVES

- * to assist students in developing a firm grasp of the underlying concepts and principles of research enterprise in science (both social and biophysical);
- * to provide a broad overview of key methodological frameworks and approaches useful in resource and environmental studies;
- * to encourage critical thinking to discern quality in research reports and proposals; * to develop skills in preparing high-quality research proposals.

Please note that this course will not be discussing in depth specific methodological tools used by researchers in the field of resource and environmental studies; these will be the focus of Research Methods II in the Winter Term.
INSTRUCTOR(S): F. Cohen

ENVI 5039.03: Indigenous Peoples and Natural Resource Issues.

This class explores issues concerning indigenous peoples (often called Aboriginal Peoples in Canada) and natural resources, within a broad environmental context. In developing an understanding of indigenous peoples and natural resources, history, ecology, anthropology, law, mainstream and aboriginal perspectives must be included. We will review some key Canadian legal cases effecting land use, resource access and management and environmental protection, as well as recent developments in other regions and in the international context. Diverse topics will be presented in readings, discussions and by guest speakers.
INSTRUCTOR(S): F. Cohen

ENVI 5041.03: Environmental Education.

This class provides a broad examination of the conceptual bases of learning and understanding the environment. It will consider current educational efforts to promote values, attitudes, and behaviors protective of environmental integrity. Topics covered will include environmental education in formal school programs, experiential environmental education, environmental literacy initiatives, continuing professional education, and the role of the media in environmental education.
INSTRUCTOR(S): F. Cohen

ENVI 5047.03: Biodiversity Conservation System Design and Management (Protected Areas Management).

Biodiversity conservation systems are increasingly necessary as human activities dominate the landscape. Precise prescriptions for their design are evolving. The theory and practice of conservation system design are explored through lectures, student presentations, discussions and exercises, as an active learning module involving the students, the instructor and the broader community. Topics include ecological integrity, ecological classification, focal species, population viability, habitat suitability and minimum critical area.
INSTRUCTOR(S): K. Beazley

ENVI 5048.03/5049.03: Independent Readings.

A reading class must first be approved by the Program Coordinator. After obtaining approval, these classes are available by arrangement with appropriate faculty members.

ENVI 5120.03: Environmental Ecology.

Each week, a different student is responsible for presenting an introduction of the seminar topic, and for chairing the discussion. There are two major types of source material, from which the seminar topics are derived: (1) The book Environmental Ecology, which provides source material for discussion of ecological effects of gaseous air pollution, climate change, toxic elements, acidification, forest decline, oil pollution, eutrophication, pesticides, forestry, extinctions, and warfare; and (2) The annual compendium State of the World, which provides source material for discussions of more broadly environmental topics, including human population and reproductive issues, sustainable systems, energy and transportation issues, environmental restoration, environmental economics, and others.
INSTRUCTOR(S): B. Freedman
CROSS-LISTING: BIOL 5060.03

ENVI 5204.03: Coastal Zone Management.

This seminar is designed to introduce students to the concepts, principles, approaches and issues associated with integrated management of coastal zones worldwide. Coastal zones are critical areas of transition between land and sea, involving complex overlaps between resource uses and government jurisdictions. This class will address the legal, policy and administrative frameworks prevailing in Canada, but will do so within the global context of coastal zone management. Case studies and examples from developed and developing countries will be used to present practical approaches to the management of multiple uses in coastal zone, including community-bases management models. The seminar will be conducted by lecture, formal student presentations, questioning and discussions of class material.
INSTRUCTOR(S): TBA
CROSS-LISTING: LAWS 2041.03, MARA 5009.03

ENVI 5205.03: Law and Policy for Resource and Environmental Management.

This class provides students with an overview of substantive and procedural aspects of Canadian law and policy related to natural resources and the environment. The class will involve lectures, guest speakers, seminar discussions and class participation. Strong emphasis is placed on the Canadian legislative and regulatory framework and the unique character of the regulated subject areas such as toxic substances, air and water quality, fisheries, forests, agriculture, minerals, parks and biodiversity. The role of the common law in preventing or redressing environmental degradation will also be addressed.
INSTRUCTOR(S): P. Tyedmers

ENVI 5480.03: Environmental Ethics.

Ethics is the science of morals in human conduct. This class examines how moral standards apply to human conduct when related to the environment and the implications for resource and environmental management. It combines lectures, discussion, films and student presentations to critically analyze assumptions and alternatives, and to address issues of: social, environmental and intergenerational justice; animal rights; ecofeminist, deep ecological and social ecology perspectives; biocentrism and ecocentrism; intrinsic and instrumental values; and Aristotelian, utilitarian and Kantian approaches.
INSTRUCTOR(S): K. Beazley

ENVI 5500.03: Socio-political Dimensions of Resource and Environmental Management.

A case-based approach is taken to the study of models, techniques and tools for governance, conflict resolution, social impact assessment, and public participation. Student groups undertake in-depth investigation of the socio-political elements of resource and environmental management experiences and projects in Atlantic Canada.
INSTRUCTOR(S): P. Duinker

ENVI 5501.03: The MREM Internship.

The internship consists of a 12-16 week placement with an organization involved in resource and environmental management. Students gain practical experience by working under professional supervision on key issues faced by the host organizations.
INSTRUCTOR(S): P. Duinker

ENVI 5504.03: Management of Resources and the Environment.

Students explore key management concepts applied in managing natural resources and the environment. Topics include management paradigms, systems, principles, approaches, tools and institutions associated with a wide range of sectors such as fisheries, forests, agriculture, the coastal zone, oceans, parks and protected areas, energy, waste, water, and others. Case studies complement lectures, seminars and field trips.
INSTRUCTOR(S): P. Duinker

ENVI 5505.03: Biophysical Dimensions of Resource and Environmental Management.

This class will introduce students to techniques and tools employed in natural resource and environmental management programs and projects and engage students in case-based problem solving learning intended to understand how bio-physical information is utilized in assessing resource and environmental issues and contributing to effective decision-making. Some of the tools that will be reviewed are environmental impact assessment, environmental site assessment, life cycle analysis, environmental monitoring and adaptive environmental assessment and management.

ENVI 5507.03: Environmental Informatics.

Information systems for environmental monitoring, analysis, communication and decision making are introduced, discussed, and experienced through lectures and hands-on exercises. Students learn to identify and use appropriate information technologies and software applications for resource and environmental management. Skills will be developed in knowledge management, data classification, geomatics, scaling, analysis techniques, and others.
FORMAT: Lecture, discussion and lab

ENVI 5508.03: MREM Project Report.

The MREM Project Report and the associated oral presentation represent the culmination of the MREM program. Working with a faculty advisor, each student prepares a scholarly report and presents the findings orally on a topic related to the work undertaken in the MREM Internship.
INSTRUCTOR(S): P. Duinker
PREREQUISITE: ENVI 5501.03: The MREM Internship

ENVI 5818.03: Management and the Natural Environment: An International Perspective.

A major public issue in the minds of business executives, politicians, scientists, and others is the effect of industrial, agribusiness and other human activities upon the bio-physical environment. The class examines questions which pointedly and forcefully confront multinational enterprises and explore the choices decision makers must make within a complex array of different economies, markets, cultures, social systems and, perhaps most important, regulatory regimes.
FORMAT: Lecture/seminar.
CROSS-LISTING: BUSI 6813.03

ENVI 9000.00: Master's Thesis.

French

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Telephone: (902) 494-2430/6816
Fax: (902) 494-1626
email: french@dal.ca

Chairperson of Department

Bednarski, B.

Professors Emeriti

Bishop, M., BA, BEd (Manchester), MA (Man), PhD (Kent, Canterbury). Poetry and poetics, modern and contemporary literature, contemporary culutre, French art, symbolism, nineteenth-century literature

Gordon, W.T., BA, MA, PhD (Toronto). Semantics, history of linguistics, translation theory, general linguistics, French second -language studies, contrastive studies

Kocourek, R., State Examination, PhD, CSc (Charles, Prague), McCulloch Professor, Chevalier dans l'ordre des Palmes Académiques

Professors

Bednarski, H.E., BA (London), MA (Dal), PhD (Laval). Quebec literature and culture, literary translation

De Méo, P., BA, MA, PhD (UCLA). Applied linguistics (L2 acquisition/ teaching), nineteenth-century literature

Oore, I.Z., BA (Tel-Aviv), MA (Waterloo), PhD (Western). Quebec literature and culture

Runte, H.R., MA, MPh, PhD (Kansas). Paleography, textual criticism, philology, medieval literature, contemporary Acadian literature, comparative literature, translation

Waterson, K., BA (Long Island), MA (NYU), PhD (CUNY). Seventeenth-century literature, theatre, Acadian studies

Associate Professors

Elson, C., BA, MA (Dalhousie), Dr de 3e cycle (Sorbonne). Modern and contemporary literature and culture, theory, philosophy, art, music, cinema

Frigerio, V., Beaux Arts (Geneva), BA (York), MA, PhD (Toronto), nineteenth-century literature, Romanticism, popular writing, Swiss-French literature, sociocriticism

Hamel, M., BA, MA (Montreal), PhD (UMIST). Applied linguistics, computer-assisted language learning, natural language processing

Mopoho, R., BA (Yaounde, Cameroon), MA, PhD (Montreal). Linguistics, lexicology, the science of translation

Assistant Professors

Bélanger, A. BA, MA, PhD (UQAM). Sixteenth-century literature, rhetoric and poetry

Kasende, J.C. Licence (Zaire) MA, PhD (Ottawa). Literature and culture of *la francophonie,* Applied linguistics, L2 acquisition/teaching, Literary theory

Milicevic, J. BA (Belgrade), MA, PhD (Montreal). Graduate Coordinator, Linguistics (morphology, lexicology, semantics, pragmatics). Translation

Adjunct Professors

Arpin, M.P., BA, MA (Manitoba), PhD (Laval), Saint Francis-Xavier University

Best, J., BA (UWO), MA, PhD (Strasbourg), Acadia University

Brown, J.W., AB (Miami), MA (Middlebury), PhD (Penn)

Cauville, J., BA (Sorbonne), MA, PhD (UBC), Saint Mary's University

Eygun, F.X., BA (St. Boniface), MA (Calgary), PhD (Manitoba), Mount Saint Vincent University

Gamble, D.R., BA, MA (Toronto), PhD (St. John's, Oxford), Memorial University of Newfoundland

Lavoie, L., BA (Laurentian), MA (Laval), Dr. de 3ecycle (d'Aix-Marseille), University College of Cape Breton

Macdonald, A., MA, MLitt (Aberdeen), PhD (Harvard), Memorial University of Newfoundland

Steele, L., BA (UBC), MA (Man), PhD (Man), Mount Saint Vincent University

Research Associates

O'Reilly, M., BA (Carleton), MA, PhD (Ottawa), Memorial University of Newfoundland

Pearre, A., BA (Dal), MA (McGill), PhD (Dal)

I. Degree Programs

A. Master of Arts (MA)

For general admission rules, see the Faculty of Graduate Studies regulations.

1. Classes and research leading to the MA degree in French are offered in the areas of French and francophone literature, linguistics, second language studies and culture. Candidates must satisfy the general requirements for admission to the Faculty of Graduate Studies and must show evidence of proficiency in spoken and written French. A minimum B+ average (3.30) from a university of recognized standing is required.
2. Students may be accepted on a full-time or a part-time basis. A full-time student must spend a minimum of one year in full-time graduate study. The time normally required to complete the full-time program is one year for holders of a French Honours degree or equivalent, and two years for holders of a general degree.
3. In a one-year full-time program, the equivalent of at least five university credits is required. This will consist of a thesis (usually equivalent to two credits) plus three 5000-level credits. In a two-year full-time program, students have to attain the equivalent of Honours status (see Undergraduate Calendar) and obtain the additional five credits as required in a one-year full-time program.
4. In addition to the five credits, all MA students are normally expected to take a half-credit class in Research Methods. When appropriate, up to one additional undergraduate or graduate credit may be required in order to improve the student's proficiency in French. Part-time students carry no more than two and one-half full-credit classes during one year. A one-year full-time program corresponds to three years part-time. A two-year full-time program corresponds to six years part-time.
5. The thesis, written in French, is to be submitted and approved within the time limits set out in the Faculty of Graduate Studies regulations of this calendar.

B. PhD Program

For general rules, see the Faculty of Graduate Studies regulations.

The admission requirements are as follows: An MA thesis degree in French, an excellent French oral and written proficiency, a scholarly interest in one of the PhD thesis areas: all periods of French, Québec and Acadian literature and culture, with certain emphases, and the field of Linguistics, equally with particular emphases. Please consult the Department's PhD document for full details.

The requirements after admission are the following: Two years of Dalhousie residency, four full graduate credits (from the departmental offerings in the years of residency), a second language examination (within two years after admission), preliminary and comprehensive written and oral examinations (not less than one year prior to submission of thesis), and the PhD thesis (normally written in French) and its oral defence.

II. Selection of Classes and Registration

It is the responsibility of students admitted to one of the graduate programs to report to the graduate coordinator in the week preceding the beginning of classes, or earlier. The purpose is a briefing interview, the

final selection of classes, completion of class selection forms and the drawing up of the program of graduate studies. All graduate students must be registered before classes begin.

III. Class Descriptions

What follows is a list of PhD and MA classes. Classes required in particular cases will be specified in each student's Program of Graduate Studies. Only a limited number of classes is offered in any given year. Descriptions of the graduate classes offered in a particular year will be made available to students.

FREN 5002.03: Méthodes de recherche/ Research Methods.

Introduction to bibliographical research and styles of presentation geared to individual thesis projects. Includes library workshops on electronic search tools and the establishment of a properly formatted working bibliography in the thesis field.
INSTRUCTOR(S): P. DeMéo, O. MacLennan, R. Mopoho, H. Runte

FREN 5006.03: Philologie française: Séminaire de l'histoire du français moderne/French Philology: Seminar on the History of Modern French.

Linguistic study of literary texts from the 16th to 20th century.
INSTRUCTOR(S): H. Runte

FREN 5016.03: Aspects de la traduction/Topics in the Science of Translating.

This class aims to acquaint students with aspects of the theory and practice of translation. It assumes no prior knowledge of the field and focuses on: the presentation of key principles and concepts in the science of translating, a discussion of major theoretical issues, a description of the methodology and the cognitive process involved in translation, an examination of pertinent approaches and techniques. Class work for evaluation purposes consists of oral presentations, a mid-term and a final exam, a term paper and the translation of a variety of texts from French into English and vice versa.
INSTRUCTOR(S): R. Mopoho

FREN 5122.03: Créativité lexicale/Lexical Creativity.

Detailed study of the main forms of lexical unit creation in the French language, namely derivation, compounding, lexicalization, abbreviation, and borrowing. Application to general language, as well as to literary and scientific texts. Class work: article and book reviews; oral presentations relating to word formation in any given special language or area of activity.
INSTRUCTOR(S): R. Mopoho

FREN 5123.03: Langue et terminologie savantes/ Learned Language and Terminology.

Fundamental concepts in terminology theory. Creation of terminological files. Limited and thematic research methodology. Assessment of reference sources. Exploitation of electronic data bases. Oral presentations by students and compilation of a number of files in specific scientific and technical fields or subfields.
INSTRUCTOR(S): R. Mopoho

FREN 5124.03: Vocabulaire et culture/Vocabulary and Culture.

Examination of the influence of societal structures, traditions, values, beliefs, ideologies, etc. on language in general, and vocabulary in particular. Texts from specific groups, areas, and eras will be analyzed for illustration. Oral presentations by students.
INSTRUCTOR(S): R. Mopoho

FREN 5125.03: Sémantique/Semantics.

This class situates contributions to semantics from French scholars during the past 100 years in the broader context of international scholarship on semantics - the study of meaning which is the crossroads of linguistics, philosophy, psychology and anthropology. The class will focus on approaches to the study of meaning as they contrast with each other and as they evolve in the work of various scholars from Arsène Darmesteter (1846-1888) and Michel Bréal (1832-1915) to current practitioners of semantics.
INSTRUCTOR(S): J. Milicevic

FREN 5126.03: Aménagement linguistique/Language Planning.

Study of the relationship between languages and society, with a special emphasis on the theoretical issues involved in the concept of language planning, the typology of multilingual settings, the promotion of languages, the design and implementation of language policies, the notion of language rights, and the preservation of endangered languages. Students will be required to make oral and written presentations based on relevant cases in Canada and around the world.
INSTRUCTOR(S): R. Mopoho

FREN 5127.03: Paraphrase in language and Natural Language Processing/Paraphrase en langue et en traitement automatique des langues.

The course focuses on linguistic models of production of paraphrases and their use in Natural Language Processing (automatic text generation, reformulation, abstracting, machine translation) as a way to enhance the quality of automatically produced texts.
INSTRUCTOR(S): J. Milicevic
FORMAT: Seminar
PREREQUISITE: FREN 3020.03 or FREN 2020.03 (Introduction to Linguistics) or equivalent or istructor's permission

FREN 5130.03: Linguistique saussurienne/ Saussurean Linguistics.

An intensive study of Saussure's work, giving equal emphasis on his formative intellectual milieu, his relations with his contemporaries such as Michel Bréal, his thrice-taught class on general linguistics, the manuscript sources of the Cours de linguistique générale, critical editions, translations, the influence of Saussure on the formation of European and American structural linguistics, his influence outside linguistics (semiotics, anthropology, literary criticism), and current research into his work. The emphasis throughout will be an assimilation and critical evaluation of the Saussurean canon which students require in all branches of linguistics and allied language studies.
INSTRUCTOR(S): Staff

FREN 5140.03: B: Dialectologie acadienne et sociolinguistique/Acadian Dialectology and Sociolinguistics.

Students in this class will critically examine major studies in modern Acadian dialectology with a particular focus on regional variation. They will discuss contributions to this field by Massignon, Ryan, Peronnet, King, Richard and Starets. "Hands on" work with various linguistic atlases will be included. Evaluation will be based on in-class presentations and two major essays.

FREN 5180.03: Linguistique de texte/Linguistics of Texts.

This class is of interest to students specializing in linguistics or in literature. The first component of the syllabus examines linguistic problems that exceed sentence boundaries and belong to the emerging field of text linguistics. These may include junctive expressions, pro-forms, ellipsis, paraphrase, synonymity, dialogue structure, free indirect speech, and graphical aspects of texts. The second component concentrates on selected concepts and chapters from major contemporary publications on text linguistics. The third component will be devoted to discussions of text linguistic aspects of literary passages selected by students themselves.
INSTRUCTOR(S): Staff

FREN 5185.03: Les métaphores dans les textes/ Metaphors in Texts.

Metaphoricity can be seen as a universal capacity of full lexical units (mostly lexemes) to expand, restrict or change their usual meanings in order to reveal a similarity to an otherwise disparate referent. As such, it

has played an important role in semantic change (etymological metaphor) and in the expansion of the systemic meanings of units (lexical metaphor). This class will examine several modern linguistic contributions to the analysis of metaphorization and observe metaphors in literary texts (in particular the living metaphor, la métaphore vive).

FREN 5285.03: Sémiotique appliquée/Applied Semiotics.

This class will focus on European semiotic theory (Saussure, Barthes, Greimas et al) especially as it is applied to the literary text and other socio-cultural phenomena: the bande dessinée, film criticism, advertising and visual media.

FREN 5291.03: Computer Assisted Language Learning (CALL).

The aim of this class is to provide students with an overview of the role computer technology has played in the language learning and teaching over the last decades. Current trends and advances in CALL will be presented with an emphasis on the contribution of disciplines such as second language acquisition and language engineering.
INSTRUCTOR(S): Hamel, M.
PREREQUISITE: BA or BSc in French or equivalent (with instructor permission)

FREN 5295.03/5296.03: Séminaire: Didactique des langues secondes/Seminar: Second-Language Teaching.

This class will provide an introduction to the key issues in French second-language (FSL) teaching. It is primarily intended for French graduate students who are also teaching a first-year class in the French Department. In addition to a discussion of current trends in FSL education, there will be opportunity to practice skills in specific aspects of FSL teaching. As such, there is a strong practical component to this class, which will include peer and faculty classroom visits and critiques as well as micro-teaching during class time.
INSTRUCTOR(S): P. De Méo

FREN 5300.03: Séminaire de littérature médiévale/ Mediaeval Literature Seminar.

In-depth study of the transition from the epic to the romance mode of writing, and of the subsequent emergence of prose as the preferred narrative medium.
INSTRUCTOR(S): H. Runte

FREN 5301.03: Lectures: littérature médiévale/ Readings in Mediaeval Literature.

Individualized reading programs in selected genres or periods or on specific literary phenomena.
INSTRUCTOR(S): H. Runte

FREN 5400.03: Rabelais et son temps/Rabelais and His Time.

A study of Rabelais' work (in particular Gargantua, Pantagruel, Le Tiers Livre, Le Quart Livre) in the context of the quest(s) and spirit of the Renaissance. Particular emphasis is given to the hidden and symbolic messages present in these texts and the nature of comedy and parody.

FREN 5401.03: Montaigne et son temps/Montaigne and His Time.

Through a thorough analysis of the Essais, The Renaissance as a turning point in the history of ideas will be studied. Emphasis will be placed on the quest for knowledge, the new modalities for attaining knowledge, the genre of the essay, the problematic of the "autoportrait" and the modernity of Montaigne. Contemporary critics of Montaigne will be read or discussed (Lejeune, Foucault, Tournon) leading to an appreciation of how Montaigne has been seen through the centuries.

FREN 5500.03: L'Aventure intellectuelle du Grand Siècle/The Intellectual Adventure of French Classicism.

This class examines 17th-century French literature by focusing on a major writer, movement, genre or theme. Please contact the professor for details.
INSTRUCTOR(S): K. Waterson

FREN 5600.03: Le roman épistolaire du 18e siècle/ 18th Century Epistolary Novel.

The class will focus on the rise of the epistolary novel as a literary genre and its influence on the development of fiction. The research conducted in the seminar will be an attempt to determine and to assess some elements for a theory of the epistolary novel in 18th century France. This will be done through the study of letter manuals and novels such as those of Madame Riccoboni or Les Liaisons dangereuses by Laclos. Novels will be studied in the intellectual context of the time.
INSTRUCTOR(S): Staff

FREN 5610.03: Ethique et esthétique de la nature dans l'art et la littérature du 18e siècle/Ethics and Aesthetics in 18th century art and literature.

In this seminar students will examine, on the one hand, theoretical writings dealing with the aesthetics of nature, and, on the other hand, the ethics of virtue and the vogue of "sensibilité" as reflected in selected 18th century literary texts (poetry, novel, short stories, "traités") and in art (painting, landscape architecture).

FREN 5700.03: La révolution romantique/The Romantic Revolution.

Romanticism will be viewed as a rebellious and creative force which greatly contributed to the reshaping of traditional society. The class will attempt to evaluate the French Romantics in their intellectual and cultural significance, by defining the Romantic characteristics, and studying the Romantic aesthetics through their theoretical writings and their literary works. These will include works by Benjamin Constant, Mme de Staël, Chateaubriand, Lamartine, Vigny, Musset, Hugo, G. Sand and others.
INSTRUCTOR(S): V. Frigerio

FREN 5701.03: Le roman du 19e siecle/ 19th-Century Novel.

The class involves the intensive study of an aspect of the 19th century novel. It may be the study of a major novelist of the 19th century (e.g. Sand, Hugo, Stendhal, Flaubert, Balzac, Zola). Alternatively, the class may be organized around themes common to several novelists.
INSTRUCTOR(S): P. De Méo, V. Frigerio

FREN 5705.03: Le poème en prose au 19e siècle/ The Prose Poem in the 19th Century.

The prose poem is a literary genre that attained pre-eminence in the 19th century due in large measure to a reaction among writers against traditional poetics. The rise of the prose poem coincides with an attempt to find a "new language" that would express the spirit of modernism. Works studies will include Bertrand's Gaspard de la Nuit, Baudelaire's Petits Poèmes en prose and Rimbaud's Illuminations.

FREN 5706.03: Impressionnisme et symbolisme/ Impressionism and Symbolism.

A critical assessment of the evolution, the specificities and the interweavings of Impressionist and Symbolist practice and theory from Manet and Mallarmé to Redon and Laforgue, Rodin and Lautréamont.
INSTRUCTOR(S): Staff

FREN 5801.03: Anti-romans du 20e siecle/ Anti-Novels of the 20th Century.

Textual practice and aesthetic conception in the work of new novelists such as Butor, Robbe-Grillet, Sarraute and Duras, as well as "new new" novelists such as Sallenave, Ndiaye, Toussaint and Echenoz.
INSTRUCTOR(S): Staff

FREN 5802.03: La poésie moderne de Char à Bonnefoy/Modern Poetry from Char to Bonnefoy.

The evolution of modern poetic theory and textuality from poets such as Char and Frénaud, through Chedid and Bonnefoy, to Du Bouchet, Albiach, Bancquart and Réda.
INSTRUCTOR(S): C. Elson

FREN 5803.03: La Littérature contemporaine I/ Contemporary Literature I.

Analysis, both in-depth and more cursory, of a wide range of contemporary literary oeuvres: from Simon, Roche, Chawaf and Cixous to Deguy, Jaccottet, Zins and Tellermann. Individual aesthetic conception and practice will be related to contemporary theoretical and critico-methodological considerations.
INSTRUCTOR(S): Staff

FREN 5804.03: Art et littérature/Art and Literature.

Why write, why paint, Yves Bonnefoy asks. Multiple yet criss-crossing, chiasmic answers to this question will emerge from discussion of the writing and art of nineteenth and twentieth-century creators such as Desbordes-Valmore, Ingres, Flaubert, Corot, Zola, Cézanne, Aragon, Braque, Ponge, Ubac, Bonnefoy, Da Silva.
INSTRUCTOR(S): Staff

FREN 5805.03: La stylistique structurale/Structural Stylistics.

Structural stylistics is a contemporary critical approach to literary stylistics that grew largely out of Saussure's semiology and Jakobson's semiotic definition of the poetic function of language. The class will focus on some of the major stylisticians of the century (Bally, Spitzer, Riffaterre) and their theories of style as applied to specific literary texts from the 19th to 20th centuries.

FREN 5806.03: Poétique et théorie de la littérature/ Poetics and Theory of Literature.

Various 20th century literary theoreticians and critics in the "Geneva" and "French" schools will comprise the subject matter of this class: Starobinski, Richard, Barthes, Todorov, Greimas et al. Topics might include: thematic and/or phenomenological criticism, Marxist and ideological criticism, structuralism, post-structuralism and semiotics.
INSTRUCTOR(S): C. Elson

FREN 5807.03: Culture contemporaine/ Contemporary Culture.

Discussion of contemporary cultural theory and practice in the work of writers, philosophers, artists, etc. such as Barthes, Baudrillard, Blanchot, Bonnefoy, Derrida, Hyvrard, Irigaray, Jaccottet, Lyotard, Tal Coat, Tapies, Wittig.
INSTRUCTOR(S): C. Elson

FREN 5808.03: La littérature contemporaine II/ Contemporary Literature II.

Further analysis, independent of that of FREN 5803.03, of contemporary literature's many modes and meanings: from Dupin, Noël, Le Dantec and Redonnet to Stétié, Djebar, Glissant and Ernaux. Generic, textual and conceptual specificities will be related to theoretical and critico-methodological considerations.
INSTRUCTOR(S): Staff

FREN 5809.03: Art, cinéma et littérature en France: 1980-2002/Contemporary Art, Literature, and Film in France.

This class will assess the practice and theory of contemporary creation in French painting and other plastic forms, film and literature of the last twenty years. Discussion and analysis will lead both to work on a range of individually selected oeuvres and to one in-depth research project. It is hoped, equally, to establish the parameters of a broad contemporary aesthetics within which individual oeuvres may be understood to deploy themselves.
INSTRUCTOR(S): Staff

FREN 5876.03: Aspects de la littérature du Canada français/Studies in French Canadian Literature.

Major texts will be studied in depth and will be seen in relation to their unique social, historical and political context and, above all, to the problematics of literature itself. Topics will vary from year to year and could involve examination of a single author, period or genre, or equally, of broader issues such as the relationship between literature and language, literature and ideology, or between the oral tradition and the written one.
INSTRUCTOR(S): B. Bednarski

FREN 5877.03: Analyse de textes littéraires québécois/ Analysis of Quebec Literary Texts.

Selected literary Québec texts from the Nineteenth and/or Twentieth Centuries will be closely analyzed (the selection may vary from year to year). Recurring images and myths, central themes, main structures will be discussed and various critical approaches explored.
INSTRUCTOR(S): I. Oore

FREN 5910.03: Lecture de textes acadiens contemporains/Supervised Readings in Acadian Literature since 1968.

Study of the key texts of the last three decades, from La Sagouine to the poets of the 1990s, with special emphasis on the role of literature in the evolution of modern Acadia.
INSTRUCTOR(S): H. Runte

FREN 5920.03: Femmes écrivains et images de femmes dans la littérature française à travers les siècles/French Women Writers and Images of Women through the Centuries.

Emphasis will be placed each time on a different century. When 20th century French women writers are studied, emphasis will be given to the works of Colette, Simone de Beauvoir, Marguerite Duras, Nathalie Sarraute, Marie Cardinal, Andrée Chedid, Raphaël Billetdoux. The class will center around the literary and poetic "écritures", and when appropriate it will consider contemporary theoretical gender constructs.

FREN 5995.03: Recherches independantes/ Independent Research.

FORMAT: Directed Reading

FREN 5998.03/5999.03: Recherches indépendantes/ Independent Research.

Subject to approval by graduate coordinator and department chairperson.

IV. Thesis Areas

Literature

Modern and contemporary literatures of France, Quebec and Francophonie: poetry and poetics; novel; theatre; the conte fantastique; studies in romanticism, realism and symbolism; theory; art, cinema and other cultural studies.

Linguistics

Theoretical and applied linguistics through the following fields in particular: contrastive studies; sociolinguistics; lexicology; terminology; translation; semantics; morphology; pragmatics; text linguistics; computer assisted language learning; second language acquisition.

Gender and Women's Studies

Dalhousie University has suspended admissions to this program. This means that no new students will be accepted in the program this year at Dalhousie University.

Students may register for the following Gender and Women's Studies courses.

GWST 5170.03: Contemporary Feminist Theories.

Contemporary feminism is not a single theory but comprises multiple theoretical perspective, reflecting both a diversity in women's experience of subordination and a diversity of interests and approaches. This class aims to present some of the richness and variety in feminist theory while offering students the opportunity for sustained critical engagement with influential feminist thinkers.
INSTRUCTOR(S): S. Campbell, S. Sherwin
FORMAT: Seminar
PREREQUISITE: At least two previous classes in Gender and Women's Studies, or at least two previous classes in Philosophy, or permission of the instructor.
CROSS-LISTING: PHIL 3170.03, PHIL 5170.03, GWST 3500.03

GWST 5500.03: Topics in Feminist Philosophy.

In this class, we shall explore some of the current research in a focussed area of feminist philosophy. Previous topics have included feminist ethics, feminist epistemology, postmodern feminism, the feminist sexuality debates, and ecofeminism.
INSTRUCTOR(S): S. Campbell, S. Sherwin, P. Glazebrook
FORMAT: Seminar
PREREQUISITE: Strong background in philosophy or feminist theory (normally including at least one class in feminist philosophy or permission of the instructor)

GWST 9000.00: Master's Thesis.

German

Location: 6135 University Ave.
Halifax, NS B3H 4P9
Telephone: (902) 494-2161
Fax: (902) 494-2719
Website: http://www.dalgrad.dal.ca/homepage.htm

Chairperson of Department

Curran, J.V.

Graduate Studies Coordinator

Curran, J.V.

Honorary Professor

Michelsen, P., PhD (Gottingen), Professor of German, Heidelberg University

Professor Emeritus

Gaede, F.W., PhD (Freiburg), FRSC

Professors

Curran, J.V., MA, MA (Dal), PhD (Newcastle-upon-Tyne)
Schwarz, H.-G., MA (Munich), PhD (McGill), McCulloch Chair, Lehrauftrag (Univ. of Heidelberg)

Associate Professor

Sidler, J., MA (Freiburg), MA (Dal), PhD (Queen's)

Adjunct Professors

Aurnhammer, A., Dr. phil. habil. (Univ. of Freiburg)
Curran, T.H., MA, (Dal), PhD (Durham, England)
Grüning, H.-G., Dott. (Univ. of Macerata)
Heuer, F., Dr. phil. (Univ. of Heidelberg)
Kanzog, K., Dr. phil. habil. (Univ. of Munich)
Strack, F., Dr. phil. habil. (Univ. of Heidelberg)

Visiting Professor

Heuer, F., Dr. phil (Univ. of Heidelberg)

I. Introduction

Graduate classes leading to the degree of MA are offered in the history of German literature and thought. Research in the Department is concerned principally with the Baroque Age, the literary and philosophical tradition of German Idealism, and the culture of the twentieth century. Special expertise in the following fields: Reception of Islamic Orient, Reception of Greek and Roman Antiquity, General and Comparative Aesthetics.

Graduate students may concentrate on any of the periods or any particular aspect of the history of German literature and thought. Interested and gifted students may continue with doctoral studies under the supervision of Dalhousie Faculty at the University of Heidelberg. The Department also actively participates in The Interdisciplinary Ph.D. Program offered by the Faculty of Graduate Studies.

II. Admission Requirements

Candidates must satisfy the general requirements for admission to the Faculty of Graduate Studies.

III. MA Degree Program

Depending on their level of preparation, students spend either one or two years towards completion of their classes and thesis.

Candidates are expected to have a reading knowledge of a third modern or ancient language. A thesis is required.

IV. Class Descriptions

GERM 5500X/Y.06: Literature and Thought from Reformation to Enlightenment.

A study of German literature between the 16th and 17th centuries as a direct reflection of the important religious, social and philosophical developments after the Reformation and during Absolutism.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

GERM 5520X/Y.06: Goethe and the Enlightenment.

A study of German literature and thought of the time which preceded and witnessed the great revolutions of the 18th century.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

GERM 5530X/Y.06: Hegel's Aesthetics and the Ancients.

NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

GERM 5540X/Y.06: Kant and the History of German Idealism.

A study of Kant's relation to modern Rationalism and Empiricism, and an inquiry into the principles of Idealism.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

GERM 5550X/Y.06: Hegel: Phenomenology of Spirit.

The Phenomenology of Spirit, published in 1807, was Hegel's first major work. He intended to write an introduction to philosophy by demonstrating the necessity of the advance from the most immediate form of knowledge to absolute knowledge. To achieve this he had to write the Phenomenology as an introduction to his own philosophy.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

GERM 5570X/Y.06: Goethe and Romanticism.

A study of Goethe, Hölderlin, Kleist, and Novalis.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

GERM 5580X/Y.06: Goethe's Faust.

A close reading of Goethe's Faust Part I and II, will give rise to questions about the unity of the work, the theory of drama and the reshaping of a legend. While Goethe's masterpiece stands at the centre, other German versions of the Faust legend will also be discussed in detail. Assignments will involve research into later echoes of the Faust legend as well.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

GERM 5590X/Y.06: Studies in German Idealism.

The specific content of the seminar varies from year to year, but is always related to some aspect of Idealism.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

GERM 5600X/Y.06: Heidegger and German Idealism.

NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

GERM 5610X/Y.06: Literature of the 19th Century.

A discussion of essential literary texts which throw a critical light on the growing forces of materialism and positivism.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): H.-G. Schwarz

GERM 5620X/Y.06: Modern German Literature.

Modern authors as witnesses of the political catastrophes and social changes of our century: a study of the plays of B. Brecht and of selected prose texts of Fr. Kafka, Th. Mann and G. Grass.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

GERM 5630X/Y.06: Aesthetic Theory.

An historical study of the development of aesthetic theory and its foundation in the history of thought. Hegel's "*Aesthetik*", Heidegger's "*Ursprung des Kunstwerkes*" and Gadamer's "*Aktualität des Schönen*" will be studied.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): H.-G. Schwarz

GERM 5640X/Y.06: Ancient and Modern Dialectics.

NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

GERM 5660X/Y.06: History and Theory of the German Novel.

Representative works from the Baroque Age to the 20th Century are studied and the principles of the genre are discussed.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

GERM 5670X/Y.06: Hegel's Philosophy of Nature.

NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

GERM 5700.03: Special Topics I.

This is an intensive research seminar dealing with selected topics to be announced.
INSTRUCTOR(S): H.-G. Schwarz

GERM 5701.03: Special Topics II.

This is an intensive research seminar dealing with selected topics to be announced.
INSTRUCTOR(S): J. Curran

GERM 5800X/Y.06: Research Seminar.

Special Research Topics Class. This is an intensive research seminar dealing with selected topics to be announced.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): H.-G. Schwarz

GERM 9000.00: Thesis.

Health and Human Performance

Location: 6230 South Street
Halifax, NS B3H 3J5
Telephone: (902) 494-2152
Fax: (902) 494-5120
Website: www.hahp.healthprofessions.dal.ca

Director of School

Livingston, L.A., BA-BPHE, MSc (Queen's), PhD (Calgary)

Professor Emeritus

Belzer, Jr., E.G., BS (West Chester State Coll), MS (Maryland), PhD (Illinois)

Professors

Campagna, P.D., BPHE (Windsor), BEd (Queen's), MEd (SUNY-Buffalo), PhD (Alta). Physical fitness, mental health, cardiovascular risk factors, physical activity assessment (accelerometers/pedometers), physical activity levels of children and youth.

Jackson, L.A., BA, MA, PhD (Toronto). The social determinants of health among vulnerable populations (eg. youth, women in the sex trade); rural health; HIV/AIDS; addictions and harm reduction; and qualitative methods.

Kirby, R.L., MD (Dal), FRCP (C), major appointment in the Department of Medicine (Division of Physical Medicine and Rehabilitation). Clinical Biomechanics. Studies are conducted in clinical aspects of biomechanics, particularly as related to the safety and performance of mobility aids like wheelchairs, ambulation aids and artificial limbs.

Lyons, R.F., BA (Dal), MEd (Xavier), PhD (Oregon). Leisure, chronic illness and disability, coping and adjustment, personal relationships, therapeutic recreation

Singleton, J.F., BA (Waterloo), MS (Penn State), PhD (Maryland). Leisure and aging; therapeutic recreation for persons with Alzheimer's disease; pre-retirement planning; leisure and ethnicity; gender and leisure; leisure and people with disabilities; the use of secondary data in leisure research.

Unruh, A., BSc (OT) (Western), MSW (Carleton), PhD (Dal). Gender appraisal and coping with pain; leisure occupations or activities and coping with serious life crisis; spirituality in health and evidence-based practice; spirituality and leisure; leisure.

Associate Professors

Beagan, B., BA, MA (Soc) (Dal), PhD (Soc) (UBC). Major appointment in the School of Occupational Therapy.

Blanchard, C., BA Honours (UPEI), MSc, PhD (Alberta). Major appointment in the Department of Medicine. Determinants of health behaviours (mainly physical activity) in diseased (i.e., cardiac patients and cancer survivors) and non-diseased (i.e., adolescents, university students, adults, ethnic disparities) populations; quality of life outcomes associated with health behaviours in diseased and non-diseased populations; statistics, research methods, and measurement.

Gahagan, J., BA, BA (Hons) (Carleton), MA (Windsor), PhD (Wayne State). HIV/AIDS prevention, care, treatment and support issues; sexual and reproductive health; access to health care resources among socially marginalized populations; HIV testing and counseling among pregnant women in Canada.

Hutchinson, S.L., BA (Victoria), MA (Dal), PhD (Georgia). Leisure education; leisure and health promotion/risk prevention; leisure-based responses to stress; theory-driven program design and evaluation.

Ipson, N.M., BA, MS, PhD (Brigham Young). Leisure program assessment; outcome measurements; volunteering as a leisure experience; volunteer management; recreation management; leisure and aging, leisure, gender, and market segmentation; target marketing for aging populations.

Karabanow, J., BA Honours, MA (McGill), PhD (U of T). Major appointment in the School of Social Work.

Kozey, J.W., BSc, MSc (Waterloo), PhD (TUNS). Clinical and Occupational Biomechanics and Physical Ergonomics. Research activities include biomechanical analysis of manual materials handling tasks, 3-D reach measurement and modeling, workstation design, personal protective equipment design and factors related to emergency helicopter egress.

Livingston, L.A., BA-BPHE, MSc (Queen's), PhD (Calgary). Clinical biomechanics with focus on lower limb morphology and its relationship to knee pathologies and the reliability, accuracy, and validity of the measurement methods utilized.

McCabe, J.F., BPE, BA (UNB), MS, EdD (Tenn). Cognitive ergonomics and human performance. Research activities involve workplace and human performance assessment techniques and the development of mental and systems models of ergonomic tasks.

McGinn, F., BRec (Dal), MA (Western Michigan), PhD (Southern Illinois University at Carbondale). HIV/AIDS and employment; chronic illness and the family; disability management and occupational analysis; distance education.

Putnam, C.A., BPE (Man), MS (Wash.), PhD (Iowa). Biomechanical Psychosocial Factors Associated with Workplace Health and Injury. Research activities involve the identification of physical and psychosocial stressors encountered in the workplace and an exploration of their interactions.

Rehman, L.A., BHK, MA (UBC), PhD (Waterloo). Leisure and entrepreneurship; leisure and work life balance; leisure and access by marginalized groups; physical activity and leisure.

Robinson, L.M., BSc (UVic), MA, PhD (Simon Fraser). Interactional/interpersonal processes in stress, coping and social support; use of information technology as a source of support and information on health concerns; pediatric and adolescent mental health; relationships and health.

Savoy, C.A., BPE (UNB), EdM (Boston), PhD (Tenn.). Performance enhancement and sport psychology counseling. Assessment intervention and evaluation of tracking programs for enhanced performance in sport and life. Expertise in team-building and the use of psychological skills counseling in team sport.

Tirone, S.C., BA (Waterloo), MA (Dal), PhD (Waterloo). Leisure and ethnic minorities and migrants, families living in poverty; youth in rural communities; community development; leisure and mental health; and people with disabilities; qualitative research methods.

Westwood, D.A., BSc, MA, PhD (Waterloo). Neuroscience, Cognitive Psychology, Motor Control. Basic research in the visual control of movement using 3D motion analysis, eye-tracking, and functional brain imaging. Applied motor control research in altered thermal environments, psychiatric disorders, and stroke.

Assistant Professors

Barnes, L.J., BPE, MSc (Dalhousie). Prevention of HIV/AIDS; HIV/AIDS grief and bereavement; school health promotion; health education/health promotion program planning and evaluation; rubella screening among university women, young adults living with cancer.

Harman, K., BSc (Toronto), MSc (Ottawa), PhD (Carleton). Major appointment in the School of Physiotherapy.

Hodges, A., PhD (British Columbia). Exercise Physiology. Research focuses on the regulation of the cardiorespiratory systems particularly during stresses such as exercise and altitude, and alterations in these systems as a result of cardiovascular and respiratory diseases. Research interests also include the physiology of athletic performance.

Loppie, C., BSc, MA, PhD (Dal). Women's sexual and reproductive health across the lifespan. Health issues facing women from diverse ethnocultural groups. Health and healing among Aboriginal peoples.

Welch, J., BA BSc Honours (Carleton), MSc (Univ. of Alberta) PhD (Purdue Univ.). Research interests include the effects of exercise and nutrition on bone adaption across the lifespan; nutrition and health; effects of Vitamin D on health in a variety of populations; and the role of Vitamin D in disease mitigation.

Adjunct Professors

Amaratunga, C., BA (Univ of Guelph), MSc (Univ of Alberta), PhD (Univ of Waterloo).
Brooks, C., MBChB (Manchester), DAuMed (London), MFVM, FFDM (Royal College of Phys), Director, Research and Development (Survival Systems Group Ltd.).
Comeau, N., BEd (UPEI), MEd (Univ of Queensland), MA, PhD (Dal).
MacLeod, D., BSc, MSc (Dal).
McIntyre, L., MD, MHSc (Toronto), FRCPC
Saulnier, C., BSc Honours (U of Ottawa), MA (Uvic), PhD (York).

The School's mission is to develop professionals and scholars who can generate, disseminate and apply knowledge to advance health and human performance.

We do this by offering undergraduate and graduate programs as well as by conducting research in health promotion, kinesiology and recreation/ leisure studies.

The School of Health and Human Performance offers master's degree programs in three areas: Master of Arts in Health Promotion, Master of Science in Kinesiology and Master of Arts in Leisure Studies. There are ongoing research programs in each of the areas of health promotion (basic health-related research and evaluation of health education/health promotion policies, programs, practices and content), kinesiology (exercise physiology, neuromuscular physiology, ergonomics, motor performance, biomechanics and sport psychology) and leisure studies (leisure and social groups such as older adults, youth or persons with health problems/disabilities; historical analysis of leisure and sport; analysis of sport and recreation administration and cultural services).

For more detailed information on the regulations regarding these programs, students are invited to visit our Website at www.hahp.healthprofessions.dal.ca

I. Admission Requirements

Candidates must satisfy the general requirements for admission to the Faculty of Graduate Studies.

Students seeking admission to any of the master's programs should have earned an excellent record during four years of undergraduate study. Candidates for the Master of Science in Kinesiology should have an honours or honours equivalent degree which includes the completion of an independent research project. An honours or honours equivalent degree is recommended for candidates for the Master of Arts in Health Promotion or Leisure Studies. Those with appropriate qualifications are normally registered in the one-year master's program. Although Dalhousie's minimum GPA requirement is a 3.0 GPA (B) and the School of Health and Human Performance requires a 3.3 (B+), the average GPA of students accepted to the School of Health and Human Performance is usually a 3.5 or better. Students from undergraduate programs in related fields (other than Health Promotion, Kinesiology, or Leisure Studies) will be considered for graduate study in the School, but may be required to register in the two-year master's program.

Qualifying work may be required of applicants whose background for advanced studies in Health Promotion, Kinesiology, or Leisure Studies is judged deficient.

The application deadline is January 15, however applications received as late as June 1 will be considered pending space availability.

Program Requirements

One full academic year (12 months) of resident study at Dalhousie University is a minimum requirement for the one-year master's degrees. Although the MA and MSc degree programs officially have a one-year residency requirement, students should expect to take from 18 to 24 months of full-time work to complete the degree. Ordinarily, for full-time students, the degree must be completed within four years of first registration.

Completion of the degree is also possible through part-time study. However, financial assistance is not available for students undertaking the degree on a part-time basis.

Six credits at the graduate level are required in all programs - 18 credit hours of classes and 12 credit hours of thesis work (30 credit hours). Required and elective classes for each program are listed below. Each class is normally worth 3 credit hours. Electives may be chosen from the lists of classes below, or from graduate classes offered by other departments at Dalhousie University, or, to a limited extent, at other universities.

Students may take a maximum of 6 credit hours of ancillary classes above and beyond the required program of study.

Elective classes can be taken from within or outside the School. All classes must be approved by the student's advisor/Associate Director (Graduate).

The thesis topic will be determined by the student in consultation with the thesis advisor. A thesis proposal must be approved by the candidate's thesis supervisory committee, which consists of at least three members (at least two of whom are members of the School's graduate faculty), before the thesis research may be undertaken.

Once the proposal has been approved by the thesis supervising committee, it shall be submitted to either the Health Sciences Human Research Ethics Board or the Social Sciences and Humanities Research Ethics Board for consideration. Only after approval has been received from both the thesis supervisory committee and the ethics committee, may the student proceed with data collection.

The thesis examination committee is responsible for approving the completed thesis after a final oral presentation by the student covering the nature and findings of the research. This committee is made up of the supervisory committee plus an external examiner approved by the Associate Director (Graduate).

The School holds research-oriented seminars during the academic year. Students are expected to attend and participate in these seminars as discussants and presenters.

II. Degree Programs

A. Master of Arts (MA) in

Health Promotion

PLEASE NOTE: Not all classes listed below are offered every year. Please consult the timetable for a current list of classes offered. Elective classes may also be taken outside the School.

Required Classes

- HPRO 5503.03: Intermediate Statistics for Health Sciences Prerequisite: Before entering HPRO 5503.03, students must have completed an introductory class in statistics with at least a "B" grade.
- HPRO 5514.03: Trends in Health Education OR HPRO 5516.03: Theoretical & Scientific Bases of Health Education.
- HPRO 5595.03: Measurement & Evaluation in Health Education and Health Promotion.
- LEIS 5501.03: Advanced Research Methods in the Social and Natural Sciences OR comparable class approved by the thesis advisor
- HPRO 9000.00: Thesis. 12 credit hours

Elective Classes

- HPRO 5514.03 and HPRO 5516.03 as listed above.
- HPRO 5518: Women's Health and the Environment
- HPRO 5600.06/5601.03/5602.03: Independent Studies. Open to independent completion of study. Interested students should consult the Associate Director (Graduate) prior to registering in the course.
- HPRO 5620.03: Topics in Health Psychology. Cross-listed with PSYO 6420.03.

B. Master of Science (MSc) in

Kinesiology

PLEASE NOTE: Not all classes listed below are offered every year. Please consult the timetable for a current list of classes offered. Elective classes may also be taken outside the School.

Required Classes

- KINE 5501.03: Advanced Research Methods in the Social and Natural Sciences
- KINE 5590.03: Measurement and Instrumentation
- One of:
  - KINE 5510.03: Cardiorespiratory Dynamics in Exercise
  - KINE 5516.03: Neuromuscular Physiology
  - KINE 5523.03: Biomechanics of Human Motion
  - KINE 5530.03: Cognitive Ergonomics
- KINE 9000.00: Thesis. 12 credit hours

Elective Classes

- KINE 5510.03, 5516.03, 5523.03 and KINE 5530.03 as listed above.
- KINE 5503.03: Intermediate Statistics for Health Sciences Prerequisite: Students must have completed an introductory class in statistics with at least a "B" grade.
- KINE 5572.03: Topics in Human Performance
- KINE 5600.06/5601.03/5602.03: Independent Studies. Open to independent completion of study. Interested students should consult with the Associate Director (Graduate) prior to registering in the course.

C. Master of Arts (MA) in

Leisure Studies

PLEASE NOTE: Not all classes listed below are offered every year. Please consult the timetable for a current list of classes offered. Elective classes may also be taken outside the School.

Required Classes

- LEIS 5501.03: Advanced Research Methods in the Social and Natural Sciences.
- LEIS 5503.03: Intermediate Statistics for Health Sciences OR another intermediate statistics class approved by the student's advisor. Prerequisite: Students must have completed an introductory class in statistics with at least a "B" grade.
- LEIS 5592.03: Interdisciplinary Basis of Leisure Science.
- LEIS 9000.00: Thesis. 12 credit hours

Elective Classes

- LEIS 5512.03: Lifestyles of Ill and Disabled Persons.
- LEIS 5561.03: Gender, Leisure and the Family.
- LEIS 5562.03: Perspectives on Youth.
- LEIS 5563.03: Leisure Behaviour and the Older Adult.
- LEIS 5600.06/5601.03/5602.03: Independent Studies. Open to independent completion of study. Interested students should consult with the Associate Director (Graduate) prior to registering in the course.

III. Class Descriptions

HPRO 5503.03: Intermediate Statistics for Health Sciences.

This class is designed as a second class in statistics and is intended to provide the graduate student with a working knowledge of the statistical issues and techniques more commonly used by researchers in the Health Sciences. The focus is on setting up appropriate statistical models and on the interpretation of the results. Statistical packages, including MINITAB and GLIM, will be used to carry out the computations. The topics to be covered include: simple linear regression, correlation, analysis of variance (ANOVA), multiple regression, inference, qualitative variables, multicollinearity, sampling experimental design, analysis of covariance and repeated measure design.
PREREQUISITE: An introductory statistics class
CROSS-LISTING: STAT 5990.03

HPRO 5514.03: Trends in Health Education.

To be an effective leader in health promotion/health education, we must be aware of the current trends and issues affecting the field. Students will examine and discuss trends and issues both as identified by the instructor and by themselves. These trends will cover a range of topics related to conceptual, social, and professional issues.

HPRO 5514.03 is an opportunity to take stock of the field, to discuss, debate, and critique trends and issues, and to generate ideas helpful in accomplishing our goals more effectively.

HPRO 5516.03: Theoretical and Scientific Bases of Health Education.

This class provides an opportunity for students to develop and further their expertise in selected areas of health education content. These areas will be examined by an analysis of relevant health-related theories and scientific inquiry. Students will prepare a paper that might serve as background information in the development of a health education program or program evaluation, and that is in a form suitable for appearance in a scholarly or popular publication.

HPRO 5518.03: Women's Health and the Environment.

This is a multi- and interdisciplinary seminar for graduate students in any faculty. The goal of the class is to explore the interconnections between women's health and the environment, with an emphasis on environmental contaminants, health, and public policy. The class will examine the evidence linking exposure to toxic chemicals and radiation to cancer, birth defects, and other manifestations of ill-health, as well as links between air and water pollution to human health. It will examine the current policy framework for addressing environmental health issues, with special attention to the tension between industry lobbies and public interest advocacy in the face of scientific uncertainty.

HPRO 5595.03: Measurement and Evaluation in Health Education and Health Promotion.

The impetus for this class is the conviction that health education and health promotion programs can be improved through evaluation. Students will be introduced to both quantitative and qualitative approaches to evaluation, in ways that have meaning to health professionals whose primary business is practice. By applying what is learnt to selected health education and health promotion programs, students are encouraged to become practitioners who evaluate.

HPRO 5600X/Y.06 (5601.03/5602.03): Independent Study in Health Promotion.

This class allows the School to provide more specialized instruction on specific topics to graduate students with particular interests. Class format is variable and may include seminars, lectures, literature searching, evaluation of papers, participation on research projects, etc. There is usually a high degree of one-on-one interaction. The independent studies are organized on a year-to-year basis in accordance with student interest and faculty expertise.

HPRO 5620.03: Topics in Health Psychology.

This seminar class is an analysis of contemporary theory and research in the field of health psychology. Two primary themes will be examined: psychological processes and health behavior (e.g. smoking, exercise, AIDS, and addictions); and coping with chronic health stressors (e.g. pain, illness and disability). The class will include a critical analysis of selected interventions for addressing specific health behaviors and stressors such as compliance strategies.
CROSS-LISTING: PSYO 6420.03

KINE 5501.03: Advanced Research Methods in the Social and Natural Sciences.

This class addresses research methods, and is designed to accommodate the variety of graduate student research interests in the School of Health and Human Performance. Principles and techniques of natural and social sciences will be examined using relevant examples from published literature. The instructor assumes that students have undergraduate level knowledge of research methods, however, initial classes will be spent reviewing basic principles. In addition, topics will include the philosophy of science, the logic of the research process, causality, measurement, and ethical procedures. Students will be introduced to the philosophical debate about the application of classical scientific methods to social phenomena, the qualitative and quantitative dichotomy, and the role of theory in research. This class provides students the opportunity to

develop the research methods section in a research proposal either for their thesis or other research endeavour.
CROSS-LISTING: LEIS 5501.03

KINE 5503.03: Intermediate Statistics for Health Sciences.

See listing for HPRO 5503.03

KINE 5510.03: Cardiorespiratory Dynamics in Exercise.

This class will involve an examination of published research concerning the health related aspects of physical fitness. For the most part, the class will follow a seminar format with practical and/or laboratory demonstrations.

KINE 5516.03: Neuromuscular Physiology.

The objectives of this class are to develop an understanding of how the neuromuscular system controls human movements. Both central and peripheral nervous systems are studied, but the emphasis is on how peripheral mechanisms regulate and control muscle recruitment. Weekly tutorials involve discussions of relevant research and the underlying mechanisms controlling recruitment. A weekly three hour lab allows students to measure many of the mechanisms and properties of muscles under discussion.

KINE 5523.03: Biomechanics of Human Motion.

This class is designed to provide an advanced understanding of mechanical principles as they apply to the analysis of human movement. Several major directions being taken in the field of Biomechanic research will be covered. This class should provide a solid foundation for students intending to conduct research in Biomechanics. Topics include: kinematics and kinetics of linked systems in two and three dimensions, linear impulse momentum analysis, work-energy analysis, analysis of interactions between linked segments, functional roles of muscles, body segment parameters, data smoothing, modelling and simulation.

KINE 5530.03: Cognitive Ergonomics.

This class is designed to provide an in-depth treatment of human information processing capabilities and how this knowledge can be applied in ergonomic settings. The format of the class is a combination of brief lectures, group seminars and individual presentations. Each member of the class will complete a project and present the results to the seminar group.

KINE 5572.03: Topics in Human Performance: Motor Control.

This class is intended to be a graduate level seminar which attempts to provide careful examination of published research and other written work in the area of motor control. The first portion of the class will consist of a brief review of the mechanical and physiological foundations of motor control and an illustration of some of the most useful and popular paradigms in the field. The second portion of the class will turn to classic problems and current theoretical and empirical attempts to solve them. The last portion of the class will involve presentations by members of the seminar group. The format of the presentations can vary according to individual and the topic under consideration. Some suggestions would include: 1) a literature review of a specific topic, 2) a grant proposal for a research project and 3) the results of a study conducted during the class.

KINE 5590.03: Measurement and Instrumentation in Human Movement Analysis.

The objectives of this class are to provide the student with both a theoretical and practical understanding of the many issues related to instrumentation in Kinesiology. Students will be required to apply the fundamentals of measurement theory to specific instruments. Small experiments will be conducted and students will be required to submit a written report demonstrating their understanding of how particular instruments are used, and how results are interpreted.

KINE 5990.03: Interdisciplinary Human Nutrition.

Students will acquire current information about the basic principles of human nutrition and nutritional requirements throughout the life cycle. They will also analyze a variety of psychological, social, economic, physical, educational, and cultural factors which influence eating habits. Appropriate nutrition-related community resources will be identified. The students will gain an insight into the similarities of classmates' educational backgrounds and a further understanding of their professional roles, thus enhancing possibilities for interdisciplinary cooperation in future clinical areas and the community.
FORMAT: Lecture and Discussion
CROSS-LISTING: NURS 5990.03

KINE 5600X/Y.06 (5601.03/5602.03): Independent Study in Kinesiology.

This class allows the School to provide more specialized instruction on specific topics to graduate students with particular interests. Class format is variable and may include seminars, lectures, literature searching, evaluation of papers, participation on research projects, etc. There is usually a high degree of one-on-one interaction. The independent studies are organized on a year-to-year basis in accordance with student interest and faculty expertise.

LEIS 5501.03: Advanced Research Methods in the Social and Natural Sciences.

Please see class description for KINE 5501.03.
CROSS-LISTING: KINE 5501.03

LEIS 5503.03: Intermediate Statistics for Health Sciences.

See listing for HPRO 5503.03.

LEIS 5512.03: Lifestyles of Ill and Disabled Persons.

This class involves the identification and critical analysis of issues in the leisure and lifestyle of persons with chronic health problems and disabilities. Students gain a knowledge and understanding of selected issues and research through readings, field experiences, and classroom discussion. Alternative solutions to current problems faced by practitioners and advocates are assessed. Issues include: psycho-social theory of illness/disability, professional preparation, legislation, service development, support services, implementation of the integration process, and research implications.

LEIS 5561.03: Gender, Leisure and the Family.

The basis of this class is a critical examination of the theories and concepts which have been used to study gender roles and the family in contemporary society. The application of these theories and concepts to leisure is then explored. Particular attention is paid to the relationship between paid employment, household management and leisure for males and females. In addition, the impact of changing patterns of family composition is examined.

LEIS 5562.03: Perspectives on Youth.

This class reviews some of the current issues facing youth today. Most programs which provide leisure services to youth are targeted at the majority. There are many young people who would be considered "minority" because of ethnic origin, socio-economic status or employment status. These people are seldom served by recreation services. Unemployment and underemployment pose one of the biggest fears for young people in school. The answer may not rest with job creation programs alone. It is the purpose of this class to pursue alternatives and through an experiential component be able to interact with young people directly and identify their needs. This will result in a research project.

LEIS 5563.03: Leisure Behavior and the Older Adult.

The purpose of this class will be to enhance the individual's awareness of the role that leisure plays in an older person's lifestyle. The class emphasizes the effect that crime, housing, health status, fitness level, education and income have on individual's leisure behavior. The role of organized recreation and leisure delivery systems in institutions and community settings is also elaborated on in this class.

LEIS 5592.03: Interdisciplinary Basis of Leisure Science.

Leisure behavior is determined by a complex multiplicity of factors including socialization, social-economic status, demographics, politics, economics, motives, perceptions, attitudes, personality and situational determinants. This class provides an opportunity to analyze leisure behavior including play, sport, cultural activities, by means of an interdisciplinary perspective. The class is based on social science theory applied to the study of leisure, along with historical analyses, and social and cross-cultural comparisons. A critical evaluation of leisure research is presented throughout the class.

LEIS 5600X/Y.06/5601.03/5602.03 Independent Study in Leisure Studies.

This class allows the School to provide more specialized instruction on specific topics to graduate students with particular interests. Class format is variable and may include seminars, lectures, literature searching, evaluation of papers, participation on research projects, etc. There is usually a high degree of one-on-one interaction. The independent studies are organized on a year-to-year basis in accordance with student interest and faculty expertise.

Health Informatics

Location: Faculty of Computer Science
6050 University Ave
Halifax, NS B3H 1W5
Telephone: (902) 494-2740
Fax: (902) 492-1517
Email: hinf@cs.dal.ca
Website: http://www.healthinformatics.dal.ca

Graduate Co-ordinator

Abidi, S.S.R., MS (Miami), PhD (Surrey)

Faculty

Abidi, S.S.R. (Computer Science)
Cameron, S. (Medicine)
Duffy, J. (Business Administration)
Dunbar, M.J. (Medicine)
Gao, Q. (Computer Science)
Graven, M. (Medicine)
Heywood, M. (Computer Science)
Keselj, V. (Computer Science)
Kutcher, S. (Psychology)
Marche, S. (Business Administration)
Maxwell, D. (Medicine)
Mealiea, L. (Business Administration)
Milios, E. (Computer Science)
Paterson, G. (Medicine)
Rockwood, K. (Medicine)
Shepherd, M. (Computer Science)
Sketris, I. (Pharmacy)
Toms, E.G. (Business Administration)
Veugelers, P. (Community Health & Epidemiology)
Watters, C. (Computer Science)
Zincir-Heywood, A.N. (Computer Science)
Zitner, D. (Medicine)

I. Introduction

What is health Informatics? Health Informatics studies the use of computing and information technology in health research, education, patient care, policy setting, and health services administration. The fields of information technology, health information management and health care have undergone separate development over the past 30 years. Health Informatics provides a way of studying and disseminating knowledge and skills about the interaction of information technology, health care and people.

The principal purpose of this program is to prepare individuals with knowledge and skills to use information and information technology to support clinical care, health service administration, research, and teaching so that health care and services can be provided effectively, efficiently and to those in need. There is an urgent need for professionals and scholars who understand health and health services systems, and should also understand information technology, to provide the most useful information to meet the challenges of supporting health.

This interdisciplinary program draws on resources across the University, including faculty and courses from the Faculty of Computer Science, the Faculty of Medicine, the Faculty of Management, and the Faculty of Science.

This two-year program fee degree will require full-time students to register consistently for all five terms of residency requirement. The program can also be completed on a part-time basis by students who wish to continue working while studying. Part-time students will also be

required to maintain consistent registration until completion of the program. The program consists of course work in hea.lth, information technology and management/leadership, plus a work-term or thesis.

II. Academic Objectives of the Program

- To prepare individuals with knowledge and skills in health and information technology to:
  - Support research & development and education in health
  - Support patient care and health promotion
  - Support policy development at local, provincial, national and international levels
  - Support health services administration
- Address the fundamental questions of the purposes of health services and the role of information and information technology in health.
- Address the structuring, collection and use of information for performance indicators and quality improvement
- Address the development of clinical decision support tools and methodologies

III. Admission Requirements

In order to begin studies in this field at Dalhousie University, you will need each of the following:

- An undergraduate degree in a health profession or in an information technology area
- A university course in statistics is recommended but not required
- A university course in computer programming is recommended but not required
- Preference will be given to students with two years experience in the field (information technology or health professions). Experience will be evaluated on a case by case basis, but should include some work with applying information technology to health issues.

IV. Course Requirements

A student wishing to achieve this degree will have accumulated seven full credits consisting of five full credits of required courses and either a thesis or a work term and elective courses.

V. Courses

First Term (Fall Term)

- Introduction to Health Informatics (two day orientation- non-credit)
- Health Information: Flow and Use
- Networks and the Web or Fundamentals of Clinical Care for Non-Clinicians
- Health Information Systems & Issues
- Statistics for Health Informatics

Several tutorials will also be available to strengthen areas that are pre-requisites.

Second Term (Winter Term)

- Health Information: Flow and Standards
- Knowledge Management for HI
- Research Methods
- Project Management

Third Term (Summer Term)

Registration required.
For work-term students this term will be a work term. Such students will be placed with an industry, health system partner, or health research organization. This will give them an opportunity to apply the program to specific practicum/work situations. A project report is required at the end of the work term. For thesis students, this will be a start of their research and writing work.

Fourth Term (Fall Term)

- Management and Leadership for Health Informatics
- Database and Data Mining for HI
- Three elective courses for work term students

OR

- Research work for thesis students
- One elective for thesis students

Fifth Term (Winter Term)

Registration required.
For work-term students this term will be a work term (if not completed in the third term). Such students will be placed with an industry, health system partner, or health research organization. This will give them an opportunity to apply the program to specific practicum/work situations. A project report is required at the end of the work term. For thesis students, this will be a continuation of their research and writing work.

Research

For students conducting research for a thesis, supervisors are available from a wide variety of speciality fields surrounding medicine, health care and computer science. Research interests of the faculty include electronic health records, Web information systems, data mining, and warehousing, health outcomes, the effect of technology on health policy, tele-medicine, machine learning and decision support systems, knowledge management, patient information systems and the application of standards for the exchange of health information electronically.

VI. Class Descriptions

HINF 6000.00: Introduction to Health Informatics.

A compulsory non-credit orientation to develop an understanding and framework for the study of health informatics, and to provide an introduction to the core elements of the program.
INSTRUCTOR(S): Zitner, D.
FORMAT: Seminar
PREREQUISITE: Admission to Master of Health Informatics Program

HINF 6010.03: Case Studies in Health Informatics.

By interacting with practitioners in the Health Informatics field, students will be able to consolidate all the elements form their program. Students will study cases presented by people working with concrete health informatics projects in a way that reflects the issues and principles of the field.
FORMAT: One 3 hour seminar per week
PREREQUISITE: Admission to Master of Health Informatics Program

HINF 6020.03: Research Methods.

This class explores the logic and principles of research design, measurement, and data collection. The class offers a range of methodological issues and methods, including experimental and quasi-experimental designs, survey research and sampling, measurement, and qualitative methods.
PREREQUISITE: Permission of the MHI Graduate Coordinator

HINF 6030.03: Statistics for Health Informatics.

This course will teach students in the necessary skills to carry out a wide range of statistical analyses. Students will learn the basic principles that underlie health research design, data analysis and interpretation of results.
FORMAT: Seminar
PREREQUISITE: Admission to Master of Health Informatics Program

HINF 6101.03: Health Information: Flow and Use.

This course tracks the flow and use of health information in relation to population and individual health needs, including its generation, collection, movement, storage and use in various settings. The course includes a discussion of health and health information, and of the measurement of health and health services processes.
INSTRUCTOR(S): Zitner, D.
FORMAT: Lecture, seminar and discussion
PREREQUISITE: Admission to Master of Health Informatics Program

HINF 6102.03: Health Information Flow and Standards.

This seminar course discusses technical and philosophical issues related to the capture and use of information. Issues include nomenclature; the reliability and accuracy of coding schema; interoperability; and, ISO/CEN, HL7 and Infoway standards development. Student projects will

track the flow and use of information for hospital, community and public health purposes.
FORMAT: Lecture, seminar and discussion
PREREQUISITE: Admission to Master of Health Informatics Program

HINF 6110.03: Health Information Systems & Issues.

A course about health infostructures and their strengths and weaknesses. Students will learn about how such structures operate, the issues they generate, their impact on the health of populations and their impact on the flow and use of information. Particular attention will be paid to ethical and practical health informatics issues.
INSTRUCTOR(S): Maxwell, David.
FORMAT: Seminar
PREREQUISITE: Admission to Master of Health Informatics Program

HINF 6120.03: Fundamentals of Clinical Care for Non-Clinicians.

This course consists of lectures and student-led seminars. The purpose is to enable non-clinicians to communicate with clinical experts by a) outlining the purposes of health care, b) providing information about measures of health status (comfort and function), c) outlining diagnostic strategies, d) outlining how clinicians make diagnoses, including information about diagnostic strategies, with particular reference to common ailments, e) outlining treatment choices and how clinicians distinguish between appropriate treatments for a particular condition again with reference to common afflictions.
We are not aware of any other such course offered at Dalhousie University. Students are admitted to the Master of Health Informatics program from either an IT background or from a Health sector background. We have found that the entering students must be streamed so that students from the IT background will receive more of an introduction to the health care system and those from the Health background will take the introduction to IT course that already exists. This course will serve as the additional course required for students from the IT background.
INSTRUCTOR(S): D. Zitner
FORMAT: Seminar
PREREQUISITE: Admission to a health related graduate program

HINF 6210.03: Databases and Data Mining for Health Informatics.

Health organizations collect massive amount of data to support clinical decision-making, outcome measurement, policy setting, administration and research. This course provides a conceptual understanding of various data mining algorithms and introduces healthcare-related data mining strategies to facilitate the mining of real-life healthcare data to provide data-driven healthcare decision-support services.
FORMAT: Lecture
PREREQUISITE: Admission to Master of Health Informatics Program

HINF 6220.03: Networks and the Web for Health Informatics.

The purpose of this course is to provide an introduction to the principle architectures and techniques used to turn individual computers into an information system. An introduction to database design and internetworking will be followed by various protocols for communication among clients and servers across the Web.
FORMAT: Lecture
PREREQUISITE: Admission to Master of Health Informatics Program

HINF 6230.03: Knowledge Management for Health Informatics.

This class includes a technology-oriented coverage of knowledge management processes, technologies and applications to support the capture, organization, sharing and re-use of healthcare knowledge to support three main activities: Clinical decision support, practitioner and patient education, and health administration.
INSTRUCTOR(S): R. Abidi
PREREQUISITE: Admission to the Master of Health Informatics Program

HINF 6300.03: IT Project Management.

The class will cover the principles of management for information technology project. Project management for information technology has to take into account not only the most effective processes for people to work out the elements of a project, but also how to ensure the best use of information technology available for a project. The way in which groups work most effectively with technology and with each other will impact on the success of a project. Students will learn generic principles of project management as well as of information management within projects. Through case studies and field investigations of actual health information projects, students will gain a real-world understanding.
CROSS-LISTED: BUSI 6523 and ECMM 6022
FORMAT: Lecture and seminar
PREREQUISITE: Admission to Master of Health Informatics Program

HINF 6901.03: Directed Studies.

This class offers the student the opportunity to undertake further study into a specific topic of interest that is not covered in the regular class offerings. The student will be supervised by a faculty member competent in the area of interest.
FORMAT: Regular meetings between the student and supervising faculty
PREREQUISITE: Permission of Graduate Coordinator for Master of Health Informatics program.

HINF 6903.03: Special Topics in Health Informatics.

This graduate class examines topics that are not part of the regular Health Informatics curriculum.
FORMAT: Lecture/seminar
PREREQUISITE: Permission of the Graduate Coordinator for Master of Health Informatics program

HINF 7000.06: Internship.

FORMAT: Internship
PREREQUISITE: Permission of the Graduate Coordinator for Master of Health Informatics program

HINF 9000.12: Graduate Thesis.

PREREQUISITE: Permission of Graduate Coordinator for Master of Computer Science Program

Health Services Administration

Location: 5599 Fenwick Street
Halifax, NS B3H 1R2
Telephone:(902) 494-7097
Fax: (902) 494-6849
Email: Health.Services.Administration@Dal.Ca
Website: http://www.dal.ca/shsa

Director of School

Byrne, J., BA (St. FX), MA, PhD (Kansas), MHSA (Dal). Executive decision-making, managing change, health policy.

Professors Emeriti

Cohen, M., BA, DMD, MSD, PhD, MPH, major appointment in Faculty of Dentistry
Nestman, L., BComm (Sask), CA, MHSA (Alta).

Professors

Byrne, J., BA (St. FX), MA, PhD (Kansas), MHSA (Dal). Executive decision-making, managing change, health policy.
Grunfeld, E., BA, BSc, MSc, MD, DAcu, DPhil, major appointment in Faculty of Medicine
Johnston, G., BSc(Hons) (McGill), MHSA (Alta), PhD (Western). Cervical cancer screening, palliative care, breast cancer issues, cancer registries
Rathwell, T., BA (York), MA, PhD (Dunelm). Health care reform, comparative health care systems, primary health care policies.
Sketris, I., BSc (Pharm) (Toronto), PharmD (Minn), MPA (HSA) (Dal). Major appointment in College of Pharmacy

Associate Professors

MacKinnon, N., PhD RPh. Major appointment in College of Pharmacy
Persaud, D. D., MSc (Queens), MSA (Central Michigan), PhD (Toronto). Institutional theory, resource dependency theory, information systems, quality of life measurement and health services utilization

Assistant Professors

Kirk, S., BSc, PhD (Leeds)
Simms, C., BA (SMU), MPA (Dal), MHSc (John Hopkins), DPhil (Sussex)
Luu, S., BS (Taiwan), MPH (Emory), PhD (USA)

Adjunct Professors

Boone, G., BN, MPA (Dal)
Cochrane, W.D., BA(Hons), LLB (Dal)
Hurley, M., BComm, MBA (SMU), CMA
Jreige, S., BSc (SMU), MHSA (Dal)
Maddalena, V., BN, MHSA, PhD (Dal)
Marsh, W., BComm (Dal), MBA (SMU)
Mouland, D., BSc, DHSA, MHSA (Dal)
Schmitz, K., BSc (Ottawa), MPA (HSA) (Dal), MBA (SMU)
Secord, P., BComm, MBA, MPA (Dal), PhD (Reading), CMA, CGA, CIA, FCMA
Steele, W., BComm (SMU), MA (Econ) (UNB)

Students seeking further information or help in planning classes of study in the School of Health Services Administration should contact the:

Graduate Coordinator
School of Health Services Administration
5599 Fenwick Street
Halifax, NS B3H 1R2
(902) 494-7097

The School has been designated as WHO Collaborating Centre for Health Care System Research and Development.

The MHSA program is accredited by the Commission on Accreditation of Health Care Management Education, and the School is a full member of the Association of University Programs in Health Administration. The School is also a member of the European Health Care Management Association.

The School of Health Services Administration offers a Master of Health Services Administration (MHSA) degree, and is a partner with Memorial University, the University of New Brunswick, and the University of Prince Edward Island, in the Atlantic Regional Training Centre, which offers a Master of Applied Health Services Research (MAHSR) degree.

I. Objectives - MHSA

The School of Health Services Administration offers a Master of Health Services Administration degree which meets the needs of those pursuing administrative careers in the Canadian health care delivery system. The program is designed to prepare individuals for careers in hospital administration, nursing administration, long term care administration, public and community health administration and administration in municipal, provincial and federal governments in health and health-related areas. There are employment opportunities for individuals with an MHSA in policy, planning, evaluation, administration and research.

The program seeks to provide a conceptual background for the increasingly complex managerial tasks that need to be performed in health institutions and health related governmental departments. Every effort is made to balance political, social, economic, cultural, medical and ethical approaches to understanding the health care delivery system with those of the management sciences.

The emphasis in the program is on an academic, multidisciplinary and professional education. It is academic in that it emphasizes knowledge of current research findings and treats the practice of health services administration as phenomena subject to social scientific analysis. It is multidisciplinary in that faculty are drawn from traditional social and administrative sciences. It is a professional program in the sense that it will attempt to broaden the social perspectives of the student emphasizing that a professional has a social responsibility to society and must have an appreciation of the ethical standards appropriate to a career in health services administration.

II. Application Procedure

Application forms are available from the Registrar's Office of Dalhousie University. Applications should be submitted as early as possible. Application forms, letters of reference forms etc., can be downloaded from the Registrar Office Website at: www.registrar.dal.ca

Registrar's copy of the application form, and the application fee should be submitted to the Registrar's Office.

The following supporting documents are to be sent directly to the School:

a. Original transcripts of all previous academic work (2 copies) (B+ average)
b. At least two academic letters of reference
c. Résumé/Curriculum Vitae
d. A statement of career interests and reasons for seeking admission to the School
e. GMAT (see below)
f. TOEFL for Foreign Students (see below)
g. Faculty of Graduate Studies and Department copy of the application form.

Deadlines for September admission:

April 1 International - other, and Canadian automatic scholarship consideration
June 1 Canadian - final deadline (no automatic scholarship consideration)

Candidates normally are required to sit for the Graduate Management Admission Test (GMAT). This requirement may be waived by the School of HSA Admissions Committee where the applicant has a GPA of 3.7 or above and have successful completion of a statistics course. Otherwise, GMAT results will be considered with other information submitted by applicants, in deciding on eligibility for admission.

The Test may be taken at conveniently-located computer-based testing centres throughout North America and in many other parts of the world. Candidates in US and Canada may schedule a GMAT CAT (computer-adaptive test) appointment by calling either 1-800-GMAT-NOW or a local testing centre. Candidates can schedule their test within a few days of actually taking it. However, they should consider admission deadlines and call early to maximize their chances of securing their preferred test date at the centre most convenient to them. School of Health Services Administration GMAT Number is 0690.

All students are required to demonstrate at an early stage in their studies that they are proficient in writing reports and essays in English. Candidates from countries outside Canada whose mother tongue is not English will be required to take the Test of English as a Foreign Language (TOEFL) as a requirement for admission and a minimum score of 580 must be achieved (237 on computerized testing 92 for internet based test). Further information may be obtained by writing:

Test of English as a Foreign Language
Box 899
Princeton, N.J., 08540, U.S.A.

CANDIDATES ARE ADVISED TO TAKE THE TEST(S) AT THE EARLIEST POSSIBLE DATE.

For foreign students, it is strongly recommended that all documents (transcripts and references) be submitted prior to April 1st.

III. Degree Programs

A. Part time Study

The Program offered through the School is available to students on a part time basis. A part-time student may enrol in up to two and one-half credits in any one academic year. In order to ensure that graduate students benefit from a reasonable concentration of their studies, part-time studies must normally be completed within six years.

B. LLB/MHSA

The four-year LLB/MHSA program is a collaborative effort between the Dalhousie Law School and the School of Health Services Administration. The combined LLB/MHSA enables students to select classes leading to degrees of Master of Health Services Administration and Bachelor of Law.

Candidates for the LLB/MHSA program must satisfy the entrance requirements of both programs, and may obtain further information about the combined program by contacting either the School of Health Services Administration or the Faculty of Law. For admission, students must apply to both the School of Health Services Administration and the Law School individually.Students applying for the MHSA program may submit LSAT results in lieu of GMAT results. Please consult departments for program of study details.

C. MN/MHSA

The combined MN/MHSA program, a collaborative undertaking between the School of Nursing and the School of Health Services Administration, enables students to select classes leading to degrees of Master of Nursing and Master of Health Services Administration.

Candidates for the MN/MHSA program must satisfy the entrance requirements of both programs, and may obtain further information about the combined program by contacting either the School of Health Services Administration or the School of Nursing. For admission, students must apply to both the School of Health Services Administration and the School of Nursing individually. Please consult departments for program of study details.

D. MHSA/MBA

The combined MHSA/MBA program, a collaboration between the School of Health Services Administration and the School of Business, is a 3 year program which enables students to select classes leading to degrees of Master of Health Services Administration and Master of Business Administration.

Candidates for the MHSA/MBA program must satisfy the entrance requirements of both programs and may obtain further information about the combined program by contacting either the School of Health Services Administration or the School of Business. For admission, students must apply to both the School of Health Services Administration and the School of Business individually. Please consult departments for program of study details.

Note: For all combined degrees, requirements for both programs must be met before a student can convocate.

E. MHSA Thesis Option

The School offers an MHSA thesis option that typically is open to one to three new students per year. Thesis option students are expected to complete their MHSA within a similar time frame as course-work MHSA students, this is a normally 20 months for full time students although the time period may be longer for thesis students. Student research topics should be consistent with the School's research strategy and the availability of research advisors. Research topics should be interdisciplinary where appropriate and grounded in the field experience. Course work and "thesis option" MHSA students would complete the same first 10 required MHSA courses. Admittance into the "thesis option" would occur only after completion of the 10 required courses.

IV. General Admission Requirements

Candidates must satisfy the general requirements for admission to the Faculty of Graduate Studies. Enrollment in the School is limited. In general successful applicants should have attained at least a "B+" standing in their previous university work - undergraduate degree, honours or equivalent, required.

Admission is based on an assessment of:

- All previous academic work
- Original, complete transcripts
- Letters of academic reference
- GMAT (may be waived depending on GPA and successful completion of a statistics course)
- TOEFL (when required)
- Resume/CV
- Statement of career interests

A. Exemption

Applicants wishing to receive exemption from a required class should include class outlines for those classes previously taken which they consider to be equivalent to Dalhousie HESA classes. Where it is determined at time of admission that a student has the equivalent of a required class but is not granted advanced placement, an exemption may be permitted, so that another class is substituted for the required class.

V. Class Descriptions

The two-year program leading to a Master of Health Services Administration degree features both an academic and results-oriented curriculum. It requires the successful completion of 9-11 credits which must include:

Required Classes

HESA 5300.03: Introduction to the Canadian Health System.

This class provides a brief introduction to the history, legislation, financing and payment systems, health professionals, health promotion, ethics and values, and trends (e.g. regionalization, consumerism, primary health care) in the Canadian health care system. The class is designed as an introduction to the health services administration program. The discussion and tasks in the class are directed toward the development of a life long and self-directed learning focus, the importance of networking and interpersonal skills, written and oral communication, and values.

HESA 5315.03: Managing Change in Health Systems.

This class provides a theoretical and practical understanding of the design, implementation, and assessment of transformational and adaptive change processes within health care systems. Health system transformation is initiated and sustained by the broader social, political, technological, and economic context within which health systems function. Therefore, assessments of these and other factors related to health system change are examined. Specifically, topics that are covered include examining the environments of health care organizations, organizational culture, organizational effectiveness, knowledge management, organizational learning and innovation, business process reengineering, marketing in health systems, and creating and managing the future. Case analysis utilizing health systems examples, individual and group exercises, as well as the completion and presentation of a field project are used to facilitate participation and learning.

HESA 5320.03: Managerial Epidemiology.

This class is designed for health services administrators, not researchers. The class has three components: assessing the health status of a population using existing data; using Epi-Info for statistical analysis of associations (relative risk, odds ratio, chi-square test, confidence intervals, Mantel-Haenszel analysis, multiple logistic regression) and clinical guideline monitoring. Throughout the class, reoccurring themes are: understanding the meaning of numbers, assessing validity, and ascertaining causation, including the concepts of confounding and effect modification. A lecture format with guest speakers and some discussion is used. There are three individual (community health profile, Mantel-Haenszel and a clinical guideline poster) assignment as well as a mid term and final tests.

HESA 5330.03: Management and Design of Health Care Organizations.

Health care organizations are inherently complex and function in an increasingly dynamic environment. This course provides an introduction to the knowledge and skills necessary for the effective management of health care organizations. This is accomplished by examining the foundations of management thought, managerial roles, motivation, leadership, and job design as they relate to health care organizations. Additionally, topics such as organizational structure and design, teamwork, co-ordination and communication, and conflict management and negotiation will be examined. The major course objectives will be to provide opportunities for learning key concepts and theory in a setting which encourages discussion and feedback.

HESA 5335.03: Information Systems in Health Administration.

The main objective of this class is to prepare health administrators to manage information systems and to use information technology effectively. The strength of the class is the use of real problems, situations, cases, and experiences as supplements to the textbook and references. Students are expected to learn about processes and issues related to planning, analysis, design, procurement, implementation and management of information and information technologies in the health system.

HESA 5339.03: Introduction to Health Care Economics for Health Care Administration.

This required class provides the student with a basic understanding of economic theory and the applicability of this theory to the health policy and administration. It is a pre-requisite to HESA 5340, which emphasizes economic evaluation of health care programs and appraisal of economic policies as they related to a broader definition of health. No prior knowledge of economics is assumed; however, students are expected to possess basic quantitative skills for economics analysis.

HESA 5340.03: Economic Evaluation and Policy Issues for Health Care Administration.

This required class builds upon knowledge of economic theory and economic analysis to enable the student to become proficient in the assessment and evaluation of health policies and programs. HESA 5339.03 or an equivalent background in microeconomic theory is a pre-requisite to this class.

HESA 5345.03: Health Services Financial Accounting, Governance and Management Control.

The purpose of this class is to provide a basic understanding of management control techniques and management accounting decision making techniques and processes that exist for health service administrators. The class will cover the following topics: an introduction to management control; financial statement and analysis; break-even analysis; responsibility accounting; socio-economic aspects of budgeting; financial decisions and relevant costs.

HESA 5350.03: Health Services Management Control and Funding Systems.

The purpose of this class is to provide a basic understanding of management control and decision making techniques and funding systems that exist for health service administrations. The class will cover the following topics: management control; performance budgeting; patient classification; work measurement; responsibility accounting; socioeconomic aspects of budgeting; cost allocation; multi-year cost; financial decisions; relevant costs; and funding systems.

HESA 6100.03: Ethics and Decision-Making in Health Services Administration.

This class has three objectives: first, to raise the student's awareness of the ethical implications of decision-making in health care administration. Second, the class will assist students in the development of approaches for exploring and resolving ethical dilemmas in the workplace. Third, the class will assist students in examining and developing a greater understanding of their own value system as it relates to decision-making and management practice. The class is a combination of case study analysis, group projects, guest speakers and self-directed study.

HESA 6305.03: Health Services Outcomes.

Determining the outcomes of health services provision and measuring the performance of health care organizations are redefining how health care is strategized and delivered. This reflects the urgent need to improve health care quality and the imperative of assessing health care interventions. The objective of this class is to expose students to the origins of the medical outcomes movement, the importance of understanding the forces driving outcomes management, and the necessity of developing the requisite skills for managing health services organizations. Topics examined in the class include developing strategies for implementing an outcomes measurement system, assessing customer satisfaction and feedback, quality of life measurement, the utilization of health services, small area variations, clinical practice guidelines, disease management, outcomes in long term care, the dynamics of waiting lists, and system performance measurement. Didactic lectures, case analysis, assigned readings, assignments which combine theoretical and practical application, and a final presentation providing detailed analysis of an outcomes management project will be used to expose students to this area of health services management.

HESA 6310.03: Health Care Policy.

This class introduces the student to the evolution of Canadian health care policy. Students are exposed to three streams of study which, when taken together, help to illuminate how our health care system has emerged over time. The first stream will provide a conceptual and practical examination of public policy making which delimits the art and science of crafting health care policy. Public policy analysis will be introduced in a way that provides an overview of techniques and issues that are applicable to an understanding of health care policy at the provincial and federal levels. With this approach providing the backdrop, a second stream concentrates on current developments in the Canadian health care system as both a direct and indirect consequence of explicit and implicit public policy decisions. Finally, to facilitate interactive learning, problem solving, and critical thinking, students are required to examine and analyze a number of contemporary health care policy issues.

HESA 6330.03: Strategic Planning in Health Services.

The focus of the class is on the processes, methods, models and techniques of strategic planning and project management in a changing health care system. Relationships between strategic and operational planning will be

explored, as will the factors that both inhibit or facilitate the planning process. The overarching objective of the class is to provide students with a firm grounding in the analytical, political and interpersonal skills necessary to enable them to assess health needs, plan services accordingly, implement and to evaluate the planning process.

HESA 6340.03: Human Resources in Health Care.

The Canadian health care system, like many others, is facing unique challenges to the management of human resources. The health care environment poses particular challenges as governments and employers struggle with reform and restructuring, cost containment, and labor shortages. Human resource management is integral to the overall strategic planning process and key to organizational performance. Key industry leaders are calling for change and shifting focus to the healthy workplace to ensure success and sustainability in Canada's healthcare system. This course will provide the student with an opportunity to explore the challenges and best practises of administrative and operational management of human resources within the health care industry. Students will be challenged to understand human resource management strategies and the roles of leaders and managers to enable organizational effectiveness and efficiency and performance excellence.

HESA 6360.03: Health Care Law.

The object of this class is to introduce students to the use and effect of law as it relates to health care administration. It is designed to provide students with an appreciation of, and ability to interpret law, as well as the ability to identify actual or potential legal problems. Topics discussed in the class will include: introduction to law, malpractice in general, including the law relating to consent and to negligent treatment; the legal responsibility of the institution for employees and doctors on staff; special problems, including death and dying, abortion, sterilization, artificial insemination, transplants, venereal and other communicable diseases, mental disabilities, medical experimentation, blood alcohol samples, and child abuse; basic civil procedure (including subpoena and discovery); medical records, confidentiality and peer review; medical staff privileges; and the corporate structure of hospitals, including hospital bylaws.

HESA 6365.03: Quality Management.

Quality Management (QM) provides participants with an understanding of QM concepts and practices in health care. The goal is to prepare students to actively contribute in a QM context. The scope ranges from broad topics associated with QM as an organization development strategy to teams, tools and techniques for effective process improvement projects.
CROSS-LISTING: NURS 5865.03

HESA 6380.03: Senior Seminar in Health Services.

Each class member prepares and presents a major analytical paper on a significant unresolved health care problem related to his/her career aspirations. Practitioners and other interested persons are invited to the paper presentations scheduled during the last three weeks of class. Classes focus on debates, interprofessional learning modules, values exercises, and current issues in health care management raised by class members and the instructor. The class provides opportunities to analyse, synthesize and integrate knowledge and values while refining communication and appraisal skills. Senior Seminar is normally completed in the last term of the MHSA program.

HESA 6390X/Y.06: Health Services Residency.

A 16 week full time administrative residency is required for all students in the Master of Health Services Administration program. The objective of the residency is to provide first-hand familiarity with administrative problems and operations of a health service agency. Students are mentored by qualified, practising senior health service administrators. They apply and test administrative theories and concepts in a practical setting, and acquire administrative skills, knowledge, and perspectives through observation and contact with a diversity of programs and managers. Residency guidelines and information will available to students during orientation the first week of September.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively. Residencies are required for all students. However, due to enrollment levels, not all placements may be available in the Halifax area.

HESA 6500.03: Intermediate Statistics for Health Services.

This class introduces a number of techniques for data analysis and inference commonly used in experimental and health sciences.
The class begins with an introduction to model building in linear models and develops the techniques required for multiple regression. From here, we consider analysis of variance, factorial design, and analysis of covariance using the general techniques for linear models. The last part of the class includes techniques for contingency tables along with logistic regression. The difference between observational data and designed experiments as well as the criteria for proving causation are discussed. Throughout the class reference is made to experimental design and the assumptions behind the use of various techniques, the emphasis being on choosing an appropriate technique for evaluating a data set. The use of a computer package for graphing data and carrying out computations is an integral part of the class. Students will design and carry out a simple experiment as part of the class.

Elective Classes

Students choose 1 credit elective from the following, or other Faculties, pending approval of Graduate Coordinator.

HESA 6000.03: Nursing Administration and Leadership.

This class will provide a general overview of organizational theories, and their relationship to nursing administration. The role of the Nurse Administrator and current issues and challenges facing nurse administrators in the nineties will also be examined. Students will compare and contrast selected theories of management and be able to discuss their relationship to administrative theory and nursing practice; examine the changing roles of the nurse administrator; critique existing nursing administrative practices from a multi cultural , feminist perspective; analyze an existing nursing management organization; discuss current issues and challenges facing Canadian nurse administrators and, formulate a personal philosophy of administration.
CROSS-LISTING: NURS 6000.03

HESA 6200.03: International Health Care Management.

This online (BLS) class provides opportunity for comparative learning, the debate of common issues and concerns and discussion of work-related problems in the context of health care management. Practising health care managers, doctors, nurses, and paramedics, best understand how health care is really provided in their respective environments. The class focuses on four countries [Canada, Finland, Germany and Ireland] which provide an interesting array of approaches to health care.

HESA 6325.03: Continuing Care Administration.

This class is designed to enable students to understand and appraise government policies that have shaped the direction of Long Term Care/ Continuing Care in Canada with particular emphasis on Nova Scotia; organize and contrast a number of current structures that have been put in place to provide care to seniors; explain the concepts of aging, disabilities, dementia, and the social and medical model of care; and explain, compare, contrast, and critique a variety of issues in Long Term Care/Continuing Care including facility and community based care, leadership styles, aging in place, home care models, living wills/advanced directives and palliative care.

HESA 6341.03: Management Union Relations.

This is a seminar class which provides a comprehensive overview of labour relations in the health care system. Real life situations, cases and arbitration decisions will be analyzed and discussed. Issues studied include the certification process, the collective bargaining process, the outcomes of collective bargaining, grievance handling and the disciplinary process.

HESA 6370.03: International Comparative Funding and Insurance Systems.

On a comparative basis, funding and insurance systems will be analyzed so that critical insights that pertain to present and future issues facing the Canadian and international health care systems will be portrayed. Some issues covered: private, social insurance and state funded systems, private insurance, models for assessing risk, management of employer-based health care systems, financial incentives, funding systems, financial policy analysis etc.

HESA 6394.03: Directed Project.

In order to obtain credit, students are required to complete a written report based upon research in, or exposure to, a defined problem in health services administration. For some students, this will involve research within a health agency or government department. It may be based upon the consideration of a problem which they have encountered during their actual employment or residency. In both cases, the design of the project and the preparation of the report will be done under the supervision of a member of the faculty.

HESA 6395.03: Directed Reading.

A special program of directed reading, with appropriate written assignments, may be arranged with a member of the faculty where the interest in a subject is not sufficiently widespread to warrant offering a regular class.

VI. MAHSR

A. Objectives

The Atlantic Regional Training Centre (ARTC) through its four interconnected sites (Dalhousie University, Memorial University, University of New Brunswick and the University of Prince Edward Island) offers a Master of Applied Health Services Research (MAHSR) program. This advanced degree prepares its graduates who come from varied backgrounds and diverse disciplines, with the necessary theories and skills to investigate complex health system issues facing us today and in the future. Graduates from this interdisciplinary Masters program are expected to achieve the following learning objectives:

- Independently undertake health services research;
- Design, supervise and evaluate projects;
- Critically evaluate health services research literature;
- Employ innovative approaches in health services research through understanding diversity in decision-making environments and processes;
- Communicate health research issues and results clearly and responsibly to decision-makers, academics, professionals, and to the general public; and
- Integrate and synthesize health services research results across disciplines.

B. Faculty

University Of New Brunswick
Biden, E., ARTC Principal, School of Graduate Studies
Storr, G., RN, PhD, Faculty of Nursing

Memorial University of Newfoundland
Kearney, A., ARTC Principal, Faculty of Medicine
Audas, R., Faculty of Medicine

Dalhousie University
Rathwell, T., ARTC Principal, Faculty of Health Professions
Kenny, N., Faculty of Medicine
Ungurain, M., Faculty of Health Professions
Dow, J., Faculty of Health Professions

University of Prince Edward Island
Timmons, V., ARTC Principal, VP Academic Development
Critchley, K., School of Nursing
MacLellan, D., Family and Nutritional Sciences

Program Manager
Peyton, C., Memorial University

Site Coordinators
University of New Brunswick
John Landry
Memorial University
Christa McGrath
Dalhousie University
Saleema Karim
University of Prince Edward Island
Beverly Gerg

C. Admission Requirements

Candidates must satisfy the general requirements for admission to the Faculty of Graduate Studies. In general, successful applicants should have attained at least a minimum GPA of 3.0 or 75 percent, in their previous university work - undergraduate degree, honors or equivalent, required. These admission requirements are consistent with the minimum admission requirements for graduate education at Dalhousie, Memorial, and the University of New Brunswick, and the University of Prince Edward Island.

Admission is based on an assessment of:

- all previous academic work
- original, complete transcripts (2 copies)
- a brief statement of research and professional interests
- a brief statement describing the suitable match between the Master of Applied Health Services Research and the applicant's experiences and goals
- three letters of reference
- resume/CV
- One copy of application form. Original application form and application fee to go to Register's Office

The application deadline for the MAHSR is April 1st.

D. Financial Assistance

Upon acceptance into the program, qualifying full time students may receive a fellowship from the ARTC. Expenses associated with participation in this two-year degree program such as attendance at workshops will be paid by the ARTC.

E. Program of Study

Since the Master of Applied Health Services Research will be offered by multiple institutional partners (Dalhousie, Memorial, UNB, and UPEI), synchronous and asynchronous web-based delivery is used to provide a similar learning environment with standardized course content. Mandatory week-long workshops will be rotated between the ARTC sites. These thematic workshops are designed to facilitate learning in a collegial environment that brings together students and faculty with policy and decision makers.

In the first semester, students gain a broad picture of applied health services research through course work in the Canadian Health System; Ethical Foundations of Applied Health Research, and an introductory course in Research and Evaluation Design and Methods. The second semester focuses on health care research through course work in Qualitative and Quantitative research methods, Health Policy and the Determinants of Health.

Between the second and third semesters, students undertake a four-month research residency with a decision-making organization. The residency is designed to provide hands-on research and decision-making experience; to develop an understanding of how knowledge is transferred between the academic community and decision-makers; and to discover whether projects undertaken are of sufficient interest to the student and the host organization to merit further investigation as a thesis research topic.

In the fourth semester, students learn about knowledge transfer and research uptake and continue to develop research skills by specializing in either Qualitative or Quantitative research approaches. Preparation of a research proposal leading to the commencement of the thesis is a main course requirement of these advanced methods classes.

In the fifth and sixth semesters, students continue with their thesis that culminates with an academic defense. Students are also required to make a public presentation of their thesis research targeted to decision-makers.

F. Classes Offered

ARTC 6001.03: Canadian Health Systems.

This class proposes to give an overview of the history of the Canadian Health System and its current organization, as well as an overview of other international health system models. The key concepts that will be explored in the Canadian Health System include legislation, institutions, funding structures, human resources, and guiding values. Other issues examined will be the factors affecting health services utilization, the measurement of health outcomes and their use for accountability, and a review of health information systems in Canada and the structures and instruments within them. Finally, current issues and trends relating to the Canadian Health Care system will be reviewed.

ARTC 6002.03: Ethical Foundations of Applied Health Research.

This class will acquaint students with the ethical basis of health research, as well as the substantive issues that arise at the macro, meso and micro levels in the design and conduct of research. A variety of approaches to ethical decision-making will be surveyed, with particular attention given to how various approaches might apply in the context of Atlantic Canada. Standard topics will be explored in this course such as informed consent, privacy and confidentiality of health information, and conflicts of interest. Special attention will be given to issues of rural/urban split, respect for the integrity of communities, and the potential abuse of expert or professional authority.
CROSS-LISTING: BIOT 6002.03

ARTC 6003.03: Research and Evaluation Design and Methods.

In this class, students will become familiar with the research process with the basic aim of developing skills to critically evaluate the work of others and to understand possible approaches in the design of their own research projects. The initial emphasis in the course will be on formulating research questions and determining strategies that may be used to address a particular research theme. As the course unfolds, the approach will switch to understanding how various qualitative and quantitative research techniques may be used to address research questions that the students have posed. The students will be assessed on the critique of published research and will be required to submit written work throughout the duration of the course. One of the key features of the course is participation in class and on-line discussion. Students will target their work towards developing research questions and designing research plans to address specific questions.

ARTC 6004.03: Determinants of Health: Healthy Public Policy.

This class will explore the development of the philosophy of the determinants of health, and identify the determinants of health and their relationship with health status. As the class unfolds, students will gain an understanding of the philosophical underpinnings, as well as understanding their inter-relationships. An understanding of the complexity of developing healthy public policy that addresses multiple determinants of health will be developed by students, as well as the consideration of the implications of policy from the perspective of the determinants of health.

ARTC 6005.03: Policy and Decision Making

In this class, students will explore the process of how Canadian Health Policy is developed, implemented and evaluated. This course will also assist in building skills in the areas of research approach, critical appraisal, policy synthesis, and briefing notes. The class will follow a case based approach to understand the implications of political, social, ethical, and economic factors/actors/stakeholders.

ARTC 6006.03: Qualitative and Quantitative Methods

This class is divided into two broad sections. The first section will be an overview of statistical techniques that are appropriate to health related research. It will provide students with some basic building blocks that they can use to carry out their own research and critically evaluate the work of others. Students will be introduced to SPSS in the Quantitative Methods section (this will be used extensively in the Statistics section). The second section is designed to assist students in developing their understanding of a variety of qualitative research methods and to start to develop the skills necessary to conduct a qualitative research project. There is a focus on the general epistemological assumptions which underpin a qualitative research approach and continue with discussions of the different types of qualitative methods and modes of analysis.

ARTC 6007.03: Knowledge Transfer and Research Uptake.

This class will explore the facilitators and barriers of using evidence in decision-making, as well as developing the students' understanding of the conceptual, philosophical, and theoretical underpinnings of knowledge transfer and research uptake. Students will also learn how to create ongoing/sustainable linkages with decision makers and how to share research findings with academic and non-academic audiences. The class strengthens the program by providing students with skills to interact with stakeholders and facilitate the use of evidence in decision-making. Topics explored include Evidence Based Decision Making – barriers and facilitators, and why evidence is not used in decision-making. The class will look at how to encourage decision-makers to use research evidence through behavioral change, social marketing, and sustainable linkages.

ARTC 6008.03: Advanced Qualitative Methods.

In this class, students will build on the foundation developed in ARTC 6006. The course begins with a more in-depth examination of ontological and epistemological assumptions underpinning the various qualitative research approaches and moves to developing requisite skills for completing qualitative research. Students will gain practical experience in interviewing, participant observation and analysis of qualitative data. Students will also develop an appreciation of how to write grant proposals using qualitative approaches and continue to refine their ability to critique qualitative research. Topics explored will include many of those previously addressed in ARTC 6006 but the focus will shift to comparing and contrasting research issues for various qualitative approaches versus comparing and contrasting them to quantitative research.

ARTC 6009.03: Advanced Quantitative Research Methods.

This class will expose students to a variety of more advanced quantitative and statistical approaches to research methodology. The two main purposes of the class are to provide students with the tools to conduct advanced quantitative empirical research, and to further develop their ability to critically evaluate the work of others. Students will learn to examine issues and develop research strategies to begin to identify and answer important topics that need to be researched and students will design a realistic appraisal of what can be achieved and what cannot, given resource constraints.

ARTC 6500.06: Health Services Research Residency.

Throughout the summer, between the first and second years of the MAHSR program, students are matched with a decision-making organization to undertake a research residency. This experience is expected to assist students in understanding how research is used in decision-making; to provide an opportunity to apply theory in a practical setting; and to explore the merits of whether projects undertaken could be more fully developed as potential theses research areas.

ARTC 9000.12: MAHSR Thesis.

History

Location: 6135 University Ave.
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Telephone: (902) 494-2011
Fax: (902) 494-3349
Email: history@dal.ca
Website: history.dal.ca/Graduate%20Programs/

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Tillotson, S.M.

Graduate Coordinator
Kesselring, K.J.

Professors Emeriti
Crowley, J.E.
Flint, J.E.
Pereira, N.G.O.
Waite, P.

Professors
Girard, P., BA (Brock), LLB (McGill), LLM (Cal, Berkeley), PhD (Dalhousie) Major appointment in Law
Kirk, J., MA (Queen's), PhD (UBC), Major appointment in Spanish
Murray, T.J., MD (Dalhousie) Major appointment in Medicine
Neville, C.J., BA, MA (Carleton), PhD (Aberdeen), FRHistS
Traves, T., BA (Man), MA, PhD (York), President and Vice-Chancellor, Dalhousie University

Associate Professors
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Bell, C.M., BA (Calgary), MA (King's College London), PhD (Calgary)
Kesselring, K., BA, MA (Dalhousie), PhD (Queen's)
Kynoch, G., BA, BED (Queen's), MA, PhD (Dalhousie)
Pekacz, J.T., MA (Cracow, Poland) PhD (Polish Academy of Sciences, Warsaw), PhD (Alberta)
Tillotson, S., BIS (Waterloo), MA, PhD (Queen's)
Zachernuk, P., BA, MA (Dalhousie), PhD (Toronto)

Assistant Professors
Bingham, J., BA (UNB), MA (Toronto), PhD (York)
Campbell, C.E., BA (King's) MA, PhD (Western)
Corke, S.J., BA, MA (Guelph), PhD (UNB)
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Heilman, J., BA (Alberta), MA, PhD (Wisconsin-Madison)
McCallum, T., BA (Queen's), MA (Simon Fraser), PhD (Queen's)
Mitchell, C., BA (Regina), MA (McGill), PhD (Toronto)

Adjunct Professors
Crowley, J.E., AB (Princeton), MA (Mich), PhD (John Hopkins)
Fingard, J., BA (Hons) (Dalhousie), MPhil, PhD (London), FRSC
Forestall, N., BA (Western), MA (Memorial), PhD (Toronto), St. Francis Xavier University
Haigh, E., BSc, MSc, (U of Alberta), PhD (U of Wisconsin), St Mary's University
Howell, C., BA, MA (Dalhousie), PhD (U of Cincinnati), St Mary's University
McInnis, P., BA, MLS (Western Ontario), MA (Memorial), PhD (Queen's), St Francis Xavier
McOuat, G., BA, MA, PhD (Toronto), King's College
Mills, E., BSc (First Class Hons) (Carleton), MS, PhD (Yale)
Morrison, J., BA, BEd (Acadia), PhD (U of Ibadan), St Mary's University
Neatby, N., BA (Hons) (U of Ottawa), MA (Queen's), PhD (U of Montreal), St Mary's University
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Parpart, J., BA (Brown), MA, PhD (Boston)
Pereira, N.G.O., BA (Williams), MA, PhD (California, Berkeley)
Reid, J., BA (Hons) (Oxford), MA (Memorial), PhD (UNB), St Mary's University
Snobelen, S., BA (Hons), MA (U of Victoria), MPhil, PhD (Cambridge), King's College
Stiles, D., AB (Marshall U), MA, PhD (U of Maine), NS Agricultural College
Stokes, L.D., BA (Toronto), MA, PhD (Johns Hopkins)
Sutherland, D.A., BA (Mt A), MA (Dalhousie), PhD (Toronto)
Stuart, R., BA, MA (UBC), PhD (Florida), Mount St Vincent University
Twohig, P., BA, MA (St Mary's University), PhD (Dalhousie), St Mary's University
Twomey, R., BA (Connecticut), MA, PhD (North Illinois U), St Mary's University

I. Admission Requirements
Candidates for the one-year MA degree must hold a BA Honours degree in history or its equivalent. Those with general history BA degrees or degrees in fields other than history may be placed in a qualifying year program. Candidates for doctoral study must hold an MA degree in history or in a cognate field.

II. Degree Programs

A. Master of Arts (MA)
The MA is a research degree and can be done full-time or part-time. Applicants for the one-year MA will normally have an honours (four-year) BA or equivalent. Students in the program normally spend the first term satisfying class requirements and begin their thesis research early in the winter term, under the supervision of a faculty member, or members, in the student's area of interest.

The class requirement is normally satisfied by taking two designated advanced classes. If there are not two suitable advanced classes offered, a student may, at the discretion of the Graduate committee and on the recommendation of the student's principal supervisor, elect to fulfill one of the class requirements through a Directed Reading Course. Classes and reading courses may be selected from other departmental and extra-departmental offerings, subject to approval of the Graduate committee. (At least one class or reading course must be taught by a member of the History Department). Students will also enroll in HIST 5800, the Masters Seminar, a series of workshops and discussions that will culminate with the production of a thesis proposal. Theses may be orally examined at any time. Topics should be chosen with a view to completion within twelve months; students should note, however, that completion within sixteen months is not unusual. To complete their degree, students must submit and orally defend a thesis of not more than 50,000 words. Students in the one-year MA program are required to attend the Department Seminar which meets weekly during the academic year.

Candidates writing theses in Canadian history must demonstrate a competent reading knowledge of French; those writing theses in other fields must demonstrate a competent reading knowledge of a language other than English, as appropriate. A language examination, when this is necessary, is part of the normal thesis approval process.

Students admitted to a qualifying year program must in the first year take five upper level undergraduate history classes and secure at least an average of A-.

B. Doctor of Philosophy (PhD)
For minimum time required to complete the program, see the Faculty of Graduate Studies Regulations in this calendar.

In order to be considered a candidate for the PhD degree, students must prepare three fields, at least one of which must be outside the student's primary research area, and pass written and oral examinations in all three fields. In addition, the two major fields require a major historiographical paper. All students engaged in Canadian, Russian, European and

Medieval history research (and in other areas, if appropriate) must demonstrate a reading competence in a language other than English. A language examination, if appropriate, is part of the normal thesis approval process. A "pass" of the PhD field work is deemed to be a mark of A- or better in each element. Passes are recorded only as "P" on transcripts. Students who fail to attain the pass standard in one of three exams will be permitted to rewrite within three (3) months of the exam. Students who fail to attain the pass standard on two or three of the fields (or who fail in a rewrite attempt) will be required to withdraw from the PhD program.

A thesis is required which shall not exceed 100,000 words in length, excluding footnote references and bibliography. Doctoral theses are usually to be undertaken in the areas of Canadian, British, Russian (mid-19th century to mid-20th century), and African History. Students wishing to do a PhD thesis in areas other than those named above may be recommended for admission providing that resources are available.

To qualify for the award of the PhD degree, the thesis must make a significant and original contribution to historical study by the discovery of new information, or by the original interpretation of known information, or both.

III. Fields of Study by Directed Reading (PhD)

A. Canadian History

The following fields are offered:
History of Atlantic Canada, social, cultural, and political history of Canada, with emphasis on an integrated approach; legal history; welfare history; naval history; gender history.

B. Atlantic History

This field explores the history of the Atlantic world and its relationship to the study of Atlantic Canada. Some areas of concentration include the staples trades, native peoples, Acadians, the first British Empire, forced migrations, maritime labour, reform and responsible government, gender in Atlantic societies, industrialization, and regionalism.

C. African History

This field may be studied with special attention to gender history, social and economic history, intellectual history or labour history especially of Anglophone Africa during the pre-colonial, colonial and post-colonial periods covering the 19th and 20th centuries.

D. British History

The following fields are offered: British and Scottish legal history, 1150-1850; political, social, and cultural history of England and Scotland, 1150-1700; the history of northern England, 1100-1700; diplomatic, military and political history in the 19th and 20th centuries.

E. United States History

Fields are offered in Colonial and Revolutionary America; 19th century American social, labour, and ethnic history; Civil War and Reconstruction; 20th century American foreign relations; intelligence history; intellectual and cultural history.

F. European History

Fields are available in European history 1650-1914, especially in Italian and French history, intellectual and cultural history, behavioural history, and the social history of music.

G. German History

Only one field is available in German history: Germany 1870-1945. Within this, students may concentrate upon particular topics or periods especially relevant to their thesis work.

H. Medieval History

Fields are available in English, Scottish and medieval European history.

I. Russian History

Two fields are available: one in nineteenth-century Russian history and one in twentieth-century Russian and Soviet history.

J. Caribbean and Latin American History

Fields may be offered in modern Latin American history, especially in Cuban diplomatic, history (Cuba-Canada-Mexico), 19th century Cuban intellectual history, and Cuba during the Castro years.

K. Gender History

Fields are offered, both as single units and in combination, on women and gender in 19th and 20th century North America, early modern England, modern Europe, and Africa.

L. Islamic History

Fields are available in Ottoman, Mughal, and Safavid history, from 1500 to 1800.

IV. Senior Undergraduate/Graduate Classes

HIST 5000.03: Directed Readings.*

HIST 5001.03: Directed Readings II.*

FORMAT: This is a class of individual instruction.
RESTRICTION: Students may only register for this class with the permission of a Faculty member and the Graduate Coordinator.

HIST 5002X/Y.06: Selected Readings in History.*

NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
FORMAT: This is a class of individual instruction.
RESTRICTION: Students may only register for this class with the permission of a Faculty member and the Graduate Coordinator

HIST 5004.03: Nature and Romanticism.

Kant's "Copernican Revolution" in philosophy, ironically, marked a resurrection of a full-blown "idealist" philosophy of nature. This class will investigate the attempts of Kant's followers to construct a natural philosophy and its engagement with the rival mechanical world picture. It explores the implications of this endeavor for the growth of romanticism, vitalism, and our modern picture of "nature." It begins with an examination of the ambiguous heritage presented by Kant's writings on nature and proceeds through the attempts to develop a complete program of idealist "naturphilosophie and its spread throughout European thought by the medium of romanticist art and natural philosophy.
FORMAT: Seminar
PREREQUISITE: Instructor's permission
CROSS-LISTING: HSTC 4300.03

HIST 5056.03: Fascist and National Socialist Movements in Europe, 1900-1945.

Between the World Wars, virtually every European country had one or more groups that considered themselves or were considered fascist: in Germany and Italy, of course, but also in France, Spain, Hungary, Romania, and elsewhere. The seminar will explore the ideals, experiences, aspirations and political realities of the simultaneously threatening and fascinating historical problem.
INSTRUCTOR(S): Bingham, J.
FORMAT: Seminar
PREREQUISITE: Permission of instructor
CROSS-LISTING: HIST 3053.03

HIST 5060.03: Topics in the Civilization of Baroque Italy.

Empasizes the techniques and methods of studying history from archival sources in the Italian context, circa 1570-1740. Areas to be explored are Baroque Catholicism, social interaction, social status and display court culture, standards of living, historical ecology and geography. Substantial use of translated and transcribed archival sources.
INSTRUCTOR(S): G. Hanlon

FORMAT: Seminar
PREREQUISITE: reading knowledge of French; permission of instructor
CROSS-LISTING: HIST 4060.03

HIST 5090.03: Russian Society.

Basic institutions of 20th century Russian society are considered in their historical context, with special attention to the former role of the Party, official culture and literature, the workings of the economy, and social stratification.
RECOMMENDED: RUSN 1000.06, 2000.06
INSTRUCTOR(S): N.G.O. Pereira
FORMAT: Seminar
PREREQUISITE: Reading knowledge of Russian (at least two years of language study) and some Russian history
CROSS-LISTING: HIST 3090.03, RUSN 3090.03

HIST 5104.03: Punishment, Crime, and the Courts in Early Modern England, c. 1550-1850.

This class explores the nature and development of the English criminal justice system during the period in which it first began to be exported to other areas, and at home had to deal with the turmoil wrought by reformation, war, and industrialisation. This class will examine the uses of law – did it act in the interests of particular people or groups, and if so, how? Historians have argued that the law had both coercive and symbolic purposes – that it served to enforce and legitimise social and economic structures. We will examine these arguments and their implications. Classes will progress thematically rather than chronologically; some will be devoted to a particular type of punishment, some to the different groups of people involved in the legal process, and others to historical debates.
INSTRUCTOR(S): K.J. Kesselring
FORMAT: Seminar

HIST 5105.03: The English Civil War: Society, Religion and Politics 1603-1660.

An advanced class on one of the most tumultuous and eventful periods in British history, leading up to and including civil war and revolution 1642 to 1660. Select primary sources will be used in addition to secondary works. Topics to be studied include the social structure of early Stuart England; the Church and its critics; foreign policy; radical politics; the military class of the war; religious sectarianism; and the impact of the war and its aftermath on the populace.
INSTRUCTOR(S): K.J. Kesselring
FORMAT: Seminar
CROSS-LISTING: HIST 3105.03

HIST 5106.03: Topics in Early Modern English History.

Topics will vary from year to year, but may include the religious reformations, print culture, political protest, and state formation. The class will offer students the opportunity to examine in depth key features of the history and historiography of sixteenth and early seventeenth century England.
INSTRUCTOR(S): K.J. Kesselring
FORMAT: Seminar
CROSS-LISTING: HIST 4106.03

HIST 5110X/Y.06: Rome and the East.

This class will consider relations between Rome and her eastern neighbors -- the Parthians and the Persians -- from 54 B.C. to A.D. 628. It will examine the development of Roman policy in the region from the establishment of imperial control in the Near East to the costly wars of the early Byzantine period. Consideration will also be given to the Parthian and Persian kingdoms and to the frontier region.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
FORMAT: Seminar
CROSS-LISTING: CLAS 4535X/Y.06, 5535X/Y.06, HIST 4110X/Y.06

HIST 5160.03: Advanced Seminar in Baroque Culture.

This special summer class involves on-site work at the baroque library and theatre in the State Castle of Cesky Krumlov, Czech Republic. Research projects, in areas such as 18th century theatre, opera, court life or architecture, will involve prepatory and follow-up work at Dalhousie. Working knowledge of a relevant language is required.
FORMAT: Seminar/discussion
CROSS-LISTING: HIST 4160.03, THEA 4733.03

HIST 5222.03: Topics in Canadian Social History.

This seminar will explore major themes in Canadian social development. The topics discussed will vary from year to year but will emphasize such themes as: changing values in Canadian society; the nature of popular cultures; the relationship of order and disorder; the family; gender relations; and social classes. Approved with Canadian Studies.
FORMAT: Seminar
CROSS-LISTING: HIST 3222.03

HIST 5223.03: The Caring Society? - Welfare in Canada Since 1900.

This class examines changes over the twentieth century in the ways Canadians have dealt with people's needs, their own or others', whether for income, housing, personal care, or other matters of survival and well-being. Both private and government forms of welfare provision will be studied, with the overall purpose of understanding why Canada came to have the kind of welfare state it does. Among the topics that may be covered are: changing views on the origins and prevention of dependency; definitions of need; religious and ethnic variations in welfare practices; connections between welfare and women's lives; charitable fundraising; promoters and opponents of government social programs financing the welfare state; gender, race, constitutional, and class issues in welfare. Approved with Canadian Studies.
INSTRUCTOR(S): S. Tillotson
FORMAT: Lecture/tutorial or seminar
CROSS-LISTING: HIST 3223.03

HIST 5250.03: Popular Culture in the Atlantic World, 1650 to 1800.

This course examines the history of popular culture in the he Atlantic world. It focuses on using primary sources, such as diaries and journals, to explore the culture and customs in pre-industrial communities. We will discuss topics such as family relationships, popular ideologies, religious practices, economic discussions, students will present drafts of their research papers in class, and a revised version of the paper will be submitted at the end of term.
INSTRUCTOR(S): Bannister, J.
FORMAT: Seminar
PREREQUISITE: Instructor's permission
CROSS-LISTING: HIST 4250.03

HIST 5255.03: State and Society in Canadian History.

Political history and social history meet in this class. Its theme is the interaction between the power relations of daily life and the process of government. The topics covered may include the role of the press, the emergence of professions, tax revolts, polling, the changing functions of the law, nationalisms, resource management and the environment, patronage, and the welfare state.

HIST 5320.03: Empowerment, Gender and Development.

Feminist scholarship and activism has spawned a number of theoretical explanations for gender inequalities. In the last decade poststructuralist and postmodernist critiques have influenced feminist theories in important ways. Grand theories of the past have been called into question; universals have been overtaken by particularities and difference(s). Feminists have reacted to these critiques in a number of ways. Some reject it outright, while others call for a synthesis. Scholars and activists concerned with international development have frequently rejected these debates as irrelevant to the practical concerns of development. However, some scholars have responded more favorably to these ideas. This class will explore the various feminist theories, particularly postmodernist

influences, and assess their importance for both the theory and practice of development, especially the development of women.
FORMAT: Seminar
CROSS-LISTING: GWST 4320.03

HIST 5335.03: The Cold War.

The Cold War – a period of intense conflict between the United States and the Union of Soviet Socialist Republics – manifested in the era after the second World War and continued until George Bush and Mikhail Gorbachev proclaimed its end in 1989. In order to explore this topic, we will examine a number of issues including: the origins of the crises; the Korean War; the Cuban Missile Crisis; the Nuclear Arms Race; détente and the end of the Cold War. Rather than concentrating on the events as they unfolded, however, this course will focus on questions of interpretation and methodology. The seminars address both the historiography of the period under question and some of the theories historians have used to think about and/or interpret the Cold War experience.
INSTRUCTOR(S): S.J. Corke
FORMAT: Lecture/discussion
CROSS-LISTING: HIST 3335.03

HIST 5365.03: The Vietnam War.

This course covers the major issues of the war, including: the political and social conditions in Vietnam; the reasons for American involvement; the development of US policy toward Indochina and the legacy of the war. It also deals with the principle domestic issues that were connected to the war. Students will be encouraged to think about the war in Indochina and the domestic crises that occurred during the 1960s as an integral part of the same socio-economic and political process. A central theme of the course is that both the foreign and domestic problems were the product of a unique but interconnected set of circumstances that developed as a result of the onset of the Cold War. Rather than concentrating solely on the events as they unfolded, however, this course will focus on questions of interpretation and methodology. Toward this end, the seminars are designed to introduce students to both the historiography of the period under question and to some of the "theories" historians have used to interpret the American experience in Vietnam.
INSTRUCTOR(S): S.J. Corke
FORMAT: Lecture/seminar
CROSS-LISTING: HIST 3365.03

HIST 5370.03: North American Landscapes.

This course is an introduction to the history of landscapes in North America from the fifteenth century to the present day. Each week we will explore how nature has been understood, used, and transformed in a variety of different places across the continent, and how the history of these landscapes tie into the larger histories of Canada and the United States.
INSTRUCTOR(S): Campbell, C.
FORMAT: Lecture/seminar
CROSS-LISTING: HIST 3370.03

HIST 5380X/Y.06: Latin American History.

NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

HIST 5386.03: Colonial Latin America.

This lecture course offers an introduction to Latin America's colonial period. Stretching from pre-colonial times to independence, this course examines the people, politics, and cultures that comorised Latin America between the fourteenth and early nineteenth centuries. The course pays particular attention to issues of race, gender, class, and faith.
FORMAT: Lecture
EXCLUSION: HIST 2381

HIST 5400.03: Topics in African History.

This class will undertake a careful, in depth examination of a select theme in African history. The theme will vary from year to year, but the aim will be to probe the deep complexities of Africa's past that recent scholarship is bringing to light. Themes may be regional or continental, and could include such topics as witchcraft, resistance, urban history, religious change, migration, or nationalism. The core of the work will be a significant research paper and seminar presentations. Classes will also involve the reading, presentation, and discussion of selected readings.
INSTRUCTOR(S): G. Kynoch, P. S. Zachernuk
FORMAT: Seminar
CROSS-LISTING: HIST 4400.03

HIST 5430.03: Making of Colonial Africa (1850-1930).

European colonial rulers and business interests laid out the framework of the sub-Saharan African colonial order from about 1850 to the 1920s, seeking ways to exploit African labor and natural resources. But imperial plans were limited and sometimes frustrated by African interests, and by historical dynamics within Africa, such as the rise of new merchants and Islamic revolution. This class assesses how the realities of Africa intersected with European imperial ambitions to profoundly change African society during this early colonial period.
INSTRUCTOR(S): P. S. Zachernuk
FORMAT: Discussion
CROSS-LISTING: HIST 3430.03

HIST 5431.03: Struggles in the City: Labor, Migration and Urban Life in colonial Africa.

There were many important urban centers in pre-colonial Africa; however, colonialism and industrialisation changed both the pace and nature of urbanisation. Old cities grew and new cities and mining settlements were established. Africans came to labor in these colonial cities for a host of reasons - some were forced off their homesteads when settlers and colonial governments appropriated vast tracts of land, others needed to enter the cash economy to pay colonial taxes; women and men sought new opportunities and adventure. This movement to the cities transformed the lives of millions of Africans. This course will focus on the lives of these urban dwellers, the development of urban cultures, the gendered character of urbanisation, the creation of new social, political, economic and criminal networks, conflict and cooperation amongst urbanites, and the nature of colonial oppression and control in the cities.
INSTRUCTOR(S): G. Kynoch
FORMAT: Seminar
CROSS-LISTING: HIST 3431.03

HIST 5435.03: Rise and Fall of African Slavery.

Many African societies, like pre-industrial societies elsewhere, used slaves as well as other forms of labor for a variety of purposes. The rise of external slave trades after 1700 - notably across the Atlantic and Sahara - transformed many African societies into specialized slave exporters. As external slave trades declined in the 19th century, many African economies used extensive internal slave labor to produce exports, a pattern colonial governments were slow to change in the 20th century. This class examines these changes in African slavery, and how they affected such issues as gender relations and class structure.
INSTRUCTOR(S): P. S. Zachernuk
FORMAT: Discussion

HIST 5452.03: South Africa Since 1860.

The class examines not only the changes in race relations and politics, but also the effects of mining and other industries on rural and urban societies after the discoveries of diamonds and gold. Themes will include British policies and the "imperial factor", the growth of Afrikaner and African nationalism, the Boer War and unification, the development of apartheid and South Africa's relations with the wider world.
RECOMMENDED: HIST 3451.03, 2131.03, 2132.03
INSTRUCTOR(S): J. L. Parpart/G. Kynoch
FORMAT: Lecture/discussion
EXCLUSION: HIST 3450.06

HIST 5461.03: Gender and Development in Africa.

This class examines the economic, political and social roles of women and men in Africa from precolonial to modern times. It analyzes the way women and men construct their lives, participate in political and economic processes and contest and reinforce the definitions of womanhood and manliness in various African societies. The class will examine

development and feminist/gender theory in the light of recent debates over gender and development issues.
INSTRUCTOR(S): J.L. Parpart
FORMAT: Seminar
CROSS-LISTING: GWST 3310.03, HIST 5461.03

HIST 5462.03: African Economic History.

An examination of economic change in tropical Africa, with particular attention to the question of economic development and underdevelopment. From the premercantilist period to the current conjuncture.
INSTRUCTOR(S): J. L. Parpart
FORMAT: Seminar
CROSS-LISTING: HIST 3462.03

HIST 5470.03: Wars and Revolutions in Nineteenth Century Africa.

Africa in the nineteenth century was profoundly reshaped by a complex set of events. Muhammed Ali undertook to modernize Egypt. New Islamic states founded in the west developed plantation economies of unrivaled size. On the Atlantic coast, merchant princes made their fortunes supplying tropical goods for Europe's Industrial Revolution. In Central Africa the search for slaves and ivory both wreaked havoc and stimulated new states. In the south, the rise of Zulu power generated waves of conquest and consolidation. This class assesses the extent to which Africa was reshaped in the revolutionary century before colonial partition.
INSTRUCTOR(S): P.S. Zachernuk
FORMAT: Discussion

HIST 5471.03: Wars and Revolutions in Twentieth Century Africa.

Africa as portrayed in the Western media is a continent plagued by bloody conflicts. All too often these conflicts have not been carefully explained; rather they have been written off as "tribal" squabbles or incomprehensible episodes of barbarism. This course will examine several types of conflicts throughout the twentieth-century and will seek answers to such questions as: What initiated these conflicts? What were the combatants fighting for? How did these conflicts influence wider social, economic and political developments? In what ways did colonial policies and the colonial legacy influence African conflicts? What role has the international community played in African conflicts? What roles have African elites or local communities played in these conflicts? Grappling with these questions will allow us to move beyond simplistic explanations to acquire a better understanding of the wars and revolutions that have so marked twentieth-century Africa.
INSTRUCTOR(S): G. Kynoch
FORMAT: Seminar
CROSS-LISTING:HIST 3471.03

HIST 5475.03: African Intellectuals and the Modern Experience.

African thinkers have long pondered the challenges of the modern era, and have established lines of thought with which African intellectuals now address Africa's profound problems. But this engagement with the modern world has moved through different phases, just as the social location of the African intelligentsia has changed over time. This class will explore this intellectual history by setting specific writers in context, and then examining their original writings to ponder such questions as: What were the roots of "African Christianity"? How did African intellectuals respond to "scientific racism"? What was the appeal of Pan-Africanism? What was Negritude? How socialist was African socialism? How do postmodern insights about the invention of identify affect the idea of being "African"?
INSTRUCTOR(S): P.S. Zacherunk
FORMAT: Discussion

HIST 5500.03: Topics in Modern History.

This seminar is specifically intended for students in the Advanced Major and Honors degree programs in History. The specific content of the seminar varies from year to year, but generally involves examination of a subject in history in some depth, and may include an historiographical, comparative or interdisciplinary dimension.
FORMAT: Seminar
CROSS-LISTING: HIST 4500.03

HIST 5503.03: Sultans and Shahs.

This class will examine the post-Mongol Islamic world, and the emergence and expansion of the Ottoman, Safavid, and Mughal empires between 1500 and 1800. Particular themes of concentration will be notions of legitimacy and authority, religious orthodoxy and heterogeneity and the rise of centralized bureaucracies.
PREREQUISITE: HIST 2503 or HIST 2504
CROSS-LISTING: HIST 3510.03

HIST 5510.03: Topics in Islam and Middle East History.

This course dedicated to topics dealing with the Islamic world/Middle East from the medieval era to the present. Topics include: political thought in Islam, slavery in Islamic civilization, Nationalism and Ethnicity in the Middle East and Women in the Islamic world.
INSTRUCTOR(S): A. Ghazal
FORMAT: Seminar
PREREQUISITE: Permission of the instructor
CROSS-LISTING: HIST 4510.03

HIST 5545.03: Scripture and Statecraft: The History of Islamic Political Thought (7th-21st centuries).

This seminar focuses on the concept of the Islamic political state as it was first developed during the time of the Prophet Muhammad and the various debates that ensued in the classical and medieval periods. The seminar also focuses on Islamic scholarly discourse regarding 'mosque and state' in the wake of colonialism, westernization, and globalization.
INSTRUCTOR(S): Mitchell, C.
FORMAT: Seminar
PREREQUISITE: Instructor's permission
CROSS-LISTING: HIST 4545.03

HIST 5550.03: Orientalism and Occidentalism.

This seminar is intended for senior undergraduate and graduate students interested in discussing how scholarship has historically approached non-Western and non-Christian areas of the globe. Dating back to Herodotus, Plato, and Isocrates, the description of "the Other" has been a consistent theme in European literary and academic traditions. Whether or not it was the apologetic theological rivalry between Islam and Christianity in the Middle Ages, or the Humanist mania for non-European languages and ethnography, Occidental scholarship has historically been attracted to understanding and depicting the non-Occident. This course will examine the different European intellectual traditions of early modern Europe and how they laid the foundation for subsequent 19th and early 20th century characterizations of the Islamic world. Concurrently, however, there is evidence that a discourse of "Occidentalism" emerged among Muslim scholars and literati, and the ensuing dialectic between West and East framed the introduction of a number of political and religious ideologies to the Middle East, Iran, Central Asia, and India. There will be readings and discussions of a number of different scholars and theorists - Marx, Derrida, Focault, Chakrabarty, Said - who have commented on these discourses. Equal attention will be given to those Muslim scholars - Shayaghan, Soroush, al-Ahmad - who have written and commented on these dynamics between Western and Islamic civilization.
INSTRUCTOR(S): C.P. Mitchell
FORMAT: Seminar
CROSS-LISTING: HIST 4550.03

HIST 5600.03: Topics in Late 19th and 20th-Century American and British History.

This class will, depending upon the staffing in any particular year, examine a selection of themes in late 19th and 20th century British and American history, including, for instance, labor/labor history, political history (including state formation), cultural history, and history of race and national identify. Depending upon staffing, this class may concentrate upon the history of one country or may offer a comparative aspect. It will

be intended for graduate or senior undergraduate students with some background in either British, American or Canadian history. Evaluation will be through research papers and, possibly, a final exam.
FORMAT: Seminar
CROSS-LISTING: HIST 4600.03

HIST 5701.03: Medieval Civilization.

Each year several topics are chosen, broad enough to be used as central themes in the context of which medieval civilization may be closely examined; for instance, monasticism, universities, peasants and popular culture. Such topics are studies in some depth, where possible using original sources, and recent periodical literature and/or monographs. Students master the basic work in certain areas, but are also encouraged to develop particular topics more thoroughly. Class discussions are used to unravel contentious or difficult aspects. Students are expected to contribute to such discussions and to write several well-argued and documented papers. Some prior knowledge of medieval European history and of Latin are essential.
INSTRUCTOR(S): C.J. Neville
FORMAT: Seminar
CROSS-LISTING: HIST 4003.03

HIST 5702.03: The Medieval Church.

This class examines the power and influence of the medieval Christian church in the social, political and cultural worlds of medieval Europe, but also includes sections on the impact of the church in a wider global setting. Subjects of study include monasticism, heresy, education, devotional life, "popular" concepts of religion, the crusades, and medieval cosmology. Each year a variety of topics is studied in some detail, with the help of original documents (some in translation), and using recent periodical literature and/or monographs. Students prepare two versions of a well-researched paper which, at the graduate level, must include the use of sources in Latin. A prior knowledge of medieval European history is essential.
INSTRUCTOR(S): C.J. Neville
FORMAT: Lecture/tutorial
CROSS-LISTING: HIST 3002.03

HIST 5703.03: England and the Celtic Realm 1000-1603.

This class examines the social, political and cultural history of the Gaelic speaking peoples of the British Isles from c. 1000 to the union of the crown in 1603, with particular emphasis on relations between the peoples of Wales, Scotland, and Ireland on the one hand, and the culture of the English kingdom on the other. The class begins with a comparative study of such fundamental Celtic institutions as the family, kinship, the law, and the church at the end of the first millenium, and on the various sources that inform the early history of the three realms. It then examines in considerable depth the penetration and influence of European ideas into all three in the aftermath of the Norman Conquest of England 1066, and in the centuries that followed. Classes are conducted in the form of lecture/tutorials, that is, a single lecture once a week is followed by a tutorial in which readings relating to the lecture topic are discussed. Attendance at both is strictly required, and in tutorials especially, students are expected to participate actively by asking questions or raising discussions on disputed subjects. In an attempt to appreciate more fully the civilisation of the period, the reading of contemporary works (in translation) constitutes an integral part of class.
INSTRUCTOR(S): C.J. Neville
FORMAT: Seminar
CROSS-LISTING: HIST 3003.03

HIST 5704.03: Crime and Society in Post-Conquest England.

This class explores the development of the criminal law in England between 1066 and 1500. Attention is given to a study of the development of a more sophisticated hierarchy of courts: the local tribunals presided over by justices of the peace and sheriffs, itinerant sessions headed by the justices of assize, and the central court of King's Bench. The origins and elaboration of particular offences, including treason, felony (murder, rape, arson, burglary and larceny) and trespass are examined. Emphasis is placed on the social aspects of crime in medieval England, and extensive use is made of recent periodical literature dealing with crime and its effect in this period.
INSTRUCTOR(S): C.J. Neville
CROSS-LISTING: HIST 4004.03

HIST 5800.00: The Masters Seminar.

This course is intended to hone students' sense of their craft as historians. Its chief objective is to get students thinking about their own historical methodology, in theoretical and especially in practical terms. From the conception of a project through to its conclusion, historians should always be self-conscious about exactly what they are doing, why they are doing it, and how they are doing it. This course is designed to help develop that self-consciousness. The course will also include workshops on professional ethics, drafting grant proposals, and other such practical aspects of life as an historian. Its final product will be a polished thesis proposal. Please note that this course is a requirement for all new MA students.
INSTRUCTOR(S): Graduate Coordinator
FORMAT: Seminar

Human Communication Disorders

Location: 5599 Fenwick Street
Halifax, NS, B3H 1R2
Telephone: (902) 494-7052
Fax: (902) 494-5151

Director of the School
Armson, J.

Professor Emeritus
Green, W.B., BS, MA, PhD (Syracuse)

Professors
Armson, J., BA, MS, PhD (Temple). Stuttering, speech motor control
Kay-Raining Bird, E., BA, MSc, PhD (Wisconsin). Child language development/disorders, Down syndrome, autism, assessment, intervention
Webster, W., BSc, MA, PhD (Pennsylvania). Dean, Faculty of Health Professions

Associate Professors
Caissie, R., BPs, MSc, PhD (McGill). Audiological rehabilitation of adults, hearing aids, hearing loss and aging
Cleave, P., BA/BSW, MClSc, PhD (Kansas). Specific language impairment, Down syndrome, treatment efficacy, language disorders, intervention
Hickey, E., BS, MA, PhD (Washington). Adolescent/adult acquired neurological speech, language, cognitive disorders, treatment efficacy
Kiefte, M., BA, MSc, PhD (Alberta). Speech and auditory perception
Wang, J., BS, MA, MA, PhD (SUNY). Central auditory and cochlear physiology/pathology

Assistant Professors
Aiken, S., BA, MSc, (UWO). Electrophysiology, diagnostic audiology, hearing aids
Dobbelsteyn, C., BSc, MSc, MSc (Dalhousie). Pediatric speech disorders, cleft lip/palate, resonance disorders, pediatric feeding disorders
Ingles, J., BA, PhD (Dalhousie). Adult neurogenic language and cognitive disorders

Instructor
Harris, L., BSc, MSc, (UWO). Speech-language pathology, augmentative & alternative communication

Academic Coordinators of Clinical Education
Delorey, R., BSc, MSc (UWO)
Floyd, D., BA, MSc (Dalhousie)

Special Projects
InteRACT* and *CAP
Carey, L., BA, MA (SUNY). Director
Kostopoulos, E., BSc (Dalhousie). Coordinator

Adjunct Professors
Atkinson, S., BA, MSc (Dalhousie). Speech-language pathology, dysphagia
Blanche, P., BSc, BEd, MEd (Moncton). Auditory-verbal therapy, deaf education
Eatmon, S., BA, BEd, MEd (Moncton). Auditory-verbal therapy, deaf education
Marchand, Y., MSc, PhD (Compiegne). Language processing, computational modelling
Mencher, G.T., BA, MA, PhD (Mich), FASHA, Pediatric audiology, hearing disorders, auditory diagnosis
Moore, L., BA, BEd, MEd, MEd (Moncton). Auditory-verbal therapy, deaf education
Noel, G., BA, MSc (Dalhousie). Auditory processing disorders, tinnitus/hyperacusis, auditory evoked potential
Santilli, C., BCS, MSc (Dalhousie). Pediatric audiology, newborn hearing screening
Sharpe, M., BSc, MSc, MSc (Dalhousie). Noise and Industrial audiology, hearing conservation

Adjunct Assistant Professors (Clinical)
Comeau, M., BSc, MSc (Dalhousie)
Foster-MacDonald, L., BSc, MSc (Dalhousie)
Gulliver, M., BSc, MSc (Dalhousie)
Horsley, T., BSc, MSc (British Columbia)
MacDonald, A., BSc, MSc (Dalhousie)
Merchant, M., BA, MSc (Dalhousie)
Schmidbauer, J., BA, MA (SUNY)
Scholten, C., BSc, MSc (Dalhousie)
Wassenberg, K., BSc, MSc (Dalhousie)

The School of Human Communication Disorders provides a three-year program of studies and clinical experiences leading to a MSc degree in either speech-language pathology or audiology.

I. Admission Requirements/Deadline

All applicants must possess a minimum of a baccalaureate degree from a recognised institution of higher education. An Honours degree is a strong asset.

This program is designed for students with either minimal or no previous academic experience in the area of speech-language pathology or audiology. In most cases, applicants should have undergraduate degrees in such areas of study as psychology, biology, health sciences, kinesiology, nursing, linguistics, or education. However, students with other backgrounds will also be considered if they have completed courses in one or more of the following topics: human biology or physiology, acoustics, developmental psychology, gerontology, learning theory or abnormal psychology, speech perception, psychoacoustics, or other areas of language or linguistics. There are no specific prerequisite courses for admission into our programs. Students whose undergraduate degree is in either speech-language pathology or audiology may be considered for entrance into the program at a more advanced level under exceptional circumstances only.

Students must have attained a minimum of a B average in the last two years of undergraduate work to be considered for admission. Two academic letters of recommendation from professors in the student's undergraduate major will be required as well as a statement from the applicant indicating personal reasons for pursuing graduate work in speech-language pathology or audiology. Applications must indicate the student's preference for either audiology or speech-language pathology.

Application deadline is January 15 for September admission.

II. MSc Degree Program

This program requires three years of study. Currently the School does not offer any part time studies. Students will be required to attain a minimum of 13 credits in the Research Project Stream or 14 credits in the Thesis Stream.

Extensive supervised clinical practice is required throughout the program. Much of this requirement is met by attending a practicum held during the summer between the second and third year of study and one during the winter term of the third year.

Students are required to undertake a research activity in an area of special interest as part of their program of study. Most students undertake a research project. Projects provide students with the opportunity to develop specialized skills and are intended to make a contribution to the academic discipline or profession.

Several students per year may be selected to undertake a thesis instead of a research project. The objective is to provide students with an

opportunity to develop independence in conceptualizing and conducting research in the field of human communication disorders. A supervisory committee consisting of three members will oversee the thesis research.

III. Class Descriptions

A. Core Curriculum

While students pursue a course of study that leads to specialization in either speech-language pathology or audiology, they will be required to take classes that contain information that is basic to both professions. These classes will be described in the class listings that follow.

HUCD 5020.03: Phonetics.

This class considers the articulatory, linguistic, and acoustic aspects of phonetics and phonological development. The application of phonetics to communication disorders, and training in broad and narrow phonetic transcription are included.

HUCD 5050.03: Fundamentals of Speech Science.

This class is an introduction to speech science. It provides an overview of basic acoustics as well as the structure and function of speech systems. It provides preliminary coverage of theoretical research issues in speech physiology as well as basic topics in speech acoustics such as source-filter theory.

HUCD 5061.03: Clinical Methods I.

This introduction to practicum consists of group meetings, observation of clinical activities, and preliminary practice experiences. Meetings address basic principles and procedures of clinical practice. Clinical observations supplement the meetings. Preliminary practice experiences include participation in a language-literacy tutoring program for SLP students and sheltered practicum for audiology students.

HUCD 5062.03: Clinical Methods II.

This set of experiences includes group meetings and practicum placements. Group meetings provide advanced knowledge of clinical and supervisory processes. Practicum placements are local and include the Nova Scotia Hearing and Speech Centres, the public schools, and private practice settings.

HUCD 5120.03: Hearing Measurement.

This class deals with an overview of the basic audiological test battery including pure tone air/bone conduction, speech audiometry, immittance measurements and electrophysiologic testing (i.e., otoacoustic emissions and auditory brainstem response (ABR)). Case studies are used to solidify knowledge into clinical practice. The principles and techniques for audiometric screening are presented.

HUCD 5130.03: Introduction to Audiology and Speech-Language Pathology.

This course will help students acquire a basic understanding of the roles of speech-language pathologists (SLPs) and audiologists (AUDs) in working with clients with communication disorders. This course is meant to prepare students for further study in other specialized courses; thus, this course is designed to provide an introduction to issues that impact clinical practice in both disciplines/professions (e.g., socio-cultural issues, aging). This course will also discuss advocacy for persons with communication disorders across the lifespan.

HUCD 5140.03: Aural (Re)Habilitation with Children.

This class is designed to familiarise students with the general principles and features of communication management programs for preschool and school-age children with hearing losses. Emphasis is placed on the role and appropriate use of audition in the habilitative process.

HUCD 5150.03: Speech-Language Acquisition.

This class covers the acquisition of language (i.e., semantics, syntax, morphology, and pragmatics) from a cognitive-linguistic-social framework. Cognitive and social development are addressed as are theory and methodology in child language research. The development periods from infancy through adolescence are emphasized.

HUCD 5260.03: Hearing Disorders.

This class considers diseases, disorders and dysfunction of the auditory system which may be encountered by speech-language pathologists and audiologists. Pathologies of the peripheral and central mechanisms are included.

HUCD 5290.03: Introduction to Neurosciences for Communication Disorders.

This class will provide an introduction to neuroanatomy and neuropathology of communicative disorders. The purpose of the class is to provide the student with a basic knowledge of the neurological foundations for human communication processes. This knowledge will serve as a basis for a variety of classes in the audiology and speech-language pathology curricula.

HUCD 6310.03: Audition I.

This class provides knowledge of hearing science at an introductory level. The core of this class is the anatomy and fundamental physiology of the auditory system, from external ear through middle ear, inner to central auditory pathway. It also provides basic knowledge and principles of psychoacoustics and psychological evaluation.

HUCD 6980.03: Research Design.

This class addresses both the evaluation and implementation of research methods in speech, language and hearing disorders. It focuses on the importance of research to the clinical setting and on the development of skills to evaluate the quality of research findings. It also aims to develop the skills to design and implement theoretical and applied research: searching the literature, focusing it upon a research problem, reflecting upon models or theories and applying hypotheses, constructing internally valid methodology, analyzing and interpreting results, and drawing accurate and useful conclusions.

HUCD 7001.03/7002.03: Project.

The student is expected to choose an area of interest to carry out a research project under the direction of a faculty member. Project proposals must be approved by a School committee. End products of projects may include a paper, videotape, handbook, computer software program, as well as other options. All projects are formally presented, within a conference format, to other students, faculty, and members of the local professional community.

HUCD 7061.03: Practicum Internship.

Students are assigned supervised practicum placements on a full time basis for a 12 week period. Placements are in facilities throughout the Atlantic Provinces.

HUCD 7062.03: Practicum Externship.

Students are assigned supervised practicum placements on a full time basis for a 12 week period. Placements can occur in sites across Canada. Placements outside Canada will be considered if appropriate supervision is available.

HUCD 9000.00: Thesis.

The student is expected to formulate an original question related to human communication disorders or sciences, and with guidance from a faculty supervisor and two other members of a supervisory committee, implement a plan to answer the question.

Speech Language Pathology Curriculum (above and beyond core)

HUCD 5250.03: Speech Disorders - Children.

This course explores the nature and etiology of both articulatory and phonological disorders in children. It strives to provide a broad introduction to theoretical knowledge regarding assessment, differential diagnosis and treatment of these disorders, with application of this knowledge to clinical populations.

HUCD 5270.03: Language Disorders in Preschool Children.

This class deals with general principles of assessment and management of language disorders in preschool children across clinical etiologies. Theories of language impairments and contemporary treatment approaches are presented.

HUCD 6350.03: Assessment of Neurogenic Language and Cognitive Disorders - Adult.

The course will focus on language and cognitive disorders associated with aphasia, dementia, traumatic brain injury, and right hemisphere damage. The neuropathology, clinical symptomatology, and assessment of these conditions will be This class deals primarily with the nature and treatment of developmental stuttering. Topics include facts about its features and patterns of occurrence, theoretical perspectives concerning its nature and etiology, and treatment approaches for children and adults. The class also includes a brief overview of cluttering, psychogenic stuttering, and stuttering associated with acquired neurogenic disorders.

HUCD 6370.03: Fluency Disorders.

This class deals primarily with the nature and treatment of developmental stuttering. Topics include facts about its features and patterns of occurrence, theoretical perspectives concerning its nature and etiology, and treatment approaches for children and adults. The class also includes a brief overview of cluttering, psychogenic stuttering, and stuttering associated with acquired neurogenic disorders.

HUCD 6390.03: Voice/Resonance Disorders.

This class is designed to provide the student with an overview of the etiology, assessment, differential diagnosis and treatment of voice and resonance disorders in children and adults. Perceptual and instrumental assessment of the laryngeal and velopharyngeal mechanisms are addressed with respect to various disorders.

HUCD 6450.03: Speech Disorders - Adults.

This class considers speech disorders of neurologic origin in the adult population. The neurophysiologic basis of these disorders, their effect on the motor control of speech, and their clinical diagnosis and management are addressed.

HUCD 6460.03: Treatment of Neurogenic Language and Cognitive Disorders - Adult.

This class will focus on treatment planning using various aphasia/ cognitive-linguistic rehabilitation models and treatment procedures for adults who have acquired aphasia and cognitive-linguistic disorders. Students will achieve the skills and knowledge necessary to develop individualized intervention plans for adults with these disorders.

HUCD 6470.03: Language Disorders in School Age Children.

This class considers the nature of language impairments in school age children across clinical etiologies. The impact of language impairments on literacy and academic performance are discussed and contemporary treatment approaches are presented.

HUCD 6490.03: Advanced Language Disorders in Children.

This seminar-style class explores the development of, and assessment and intervention implications for, a variety of language disorders in children, such as intellectual disabilities, autism, and specific language impairment. Both class presentations and case-based learning are included.

HUCD 6550.03: Seminar in Adult Communication Disorders.

This class will focus on a contemporary topic in adult speech-language pathology. The specific topic will vary from year to year. Student-led seminars may cover the relevant research literature, professional issues, and clinical cases.

HUCD 6610.03: Special Topics in Speech-Language Pathology.

This class consists of three modules. One module covers issues related to assessment and intervention in Augmentative and Alternative Communication (AAC). A second module covers issues related to assessment and management of dysphagia in adults and children. A third module deals with management of laryngectomies.

B. Audiology Curriculum (above and beyond core)

HUCD 5220.03: Diagnostic Audiology.

This class considers the principles and methods of basic audiological diagnostic investigation. Emphasis is placed on speech audiometry, clinical masking, and aural immittance measures. A laboratory component provides experience with measurement techniques and exposure to the instrumentation used in these measures.

HUCD 5240.03: Aural Rehabilitation with Adults.

The first part of this class is a follow-up from HUCD6360 Amplification and covers advanced amplification issues. The second part addresses the rehabilitative needs of individuals with hearing losses, with special consideration given to older adults. Emphasis is placed on communication assessment and management approaches.

HUCD 5280.03: Audition II.

This class provides advanced knowledge of hearing science in close association with clinical practice of audiology. The focus includes cochlear biophysics, physiology and signal processing; signal processing and neurophysiology in the central auditory system; advanced discussion of psychoacoustics in association with auditory neuroscience.

HUCD 6070.03: Topics in Audiology Procedures.

Selected topics relevant to the practice of clinical audiology will be covered including tinnitus, balance disorders, ototoxicity, central auditory plasticity, and audiology instrumentation.

HUCD 6320.03: Pediatric Audiology.

This class considers the appropriate audiological assessment and management procedures used with the pediatric population. The class prepares the audiology student to work with children in a clinical setting.

HUCD 6360.03: Amplification.

This is the first class dealing with amplification. It covers hearing aid components and electroacoustic properties, methods of hearing aid selection, and verification of hearing aid fittings. Hearing needs and amplification options for people of all ages are discussed.

HUCD 6380.03: Electrophysiological Audiometric Measures.

This class considers the theory, technique, clinical application and interpretation of electrophysiological measures including the auditory brainstem response (ABR), middle components, cortical responses, otoacoustic emissions and electronystagmography (ENG).

HUCD 6420.03: Advanced Diagnostic Audiology.

This class presents advanced concepts dealing with measures sensitive to disorders of the central auditory nervous system. Both behavioral and electrophysiological testing will be reviewed. Basics of remediation will be addressed. Screening concepts will be explored.

HUCD 6440.03: Noise in Industry and the Community.

This class covers a wide range of issues in industrial audiology. It acquaints students with principles of noise measurement and analysis, updated studies on noise induced hearing loss, and hearing conservation programs. Various national and international standards, legislation, and workers' compensation will be addressed in conjunction with community noise. Laboratory experiences in industrial settings and the community are included.

HUCD 6620.03: Advanced Topics in Audiology.

This class is designed to address selective advanced issues relevant to the practice of clinical audiology. A variety of guest lecturers from the audiology and otolaryngology community will be invited to share their knowledge in areas in which they have specialized. This class will give students exposure to certain topics that they may have seen very little in their clinical practicum experiences.

Additional Classes Available

HUCD 6500.03: Tutorial Readings.

HUCD 6700.03: Independent Study.

Industrial Engineering

Location: Morroy Academic Building
5269 Morris St.
HALIFAX, NS
Telephone: (902) 494-3281
Fax: (902) 420-7858
Email: industrial.engineering@dal.ca

Department Head

Gunn, E.A., BS (MtA), MA (Dal.), PhD (Toronto), PEng. Operations research, inventory and production control, natural resources.

Professors

He, Q., BSc (China University of Science and Technology), PhD (Chinese Academy of Sciences), PhD (Waterloo). Graduate Coordinator. Operations research, queueing theory, applied probability.

Sandblom, C.L., Fil.Kand., Fil.Mag. (Lund), PhD (Birm), Modelling and optimization of linear, nonlinear and stochastic systems.

Research Professors

Barzilai, J., BSc, MSc, DSc, (Technion). Measurement theory, decision analysis, optimization.

Das, B., BScEng (Banaras), MSc, PhD (North Carolina State), FIIE, FHFES, FIEE, CEng, PEng. Industrial ergonomics, workstation design, human strength measurement, anthropometric modelling, equipment and hand tool design.

Associate Professors

Cyrus, J.P., BSc (ENG) (UWI), MASc, PhD (TUNS), PEng. Vehicle routing and scheduling, production scheduling, employee scheduling, scheduling interfaces.

Blake, J., BASc, PhD (Toronto). Industrial engineering, operational research, health applications, simulation.

Pelot, R.P., BASc (Ottawa), MASc (Alberta), PhD (Waterloo), PEng. Risk analysis, maritime applications, safety and security, environmental modelling.

Venkatadri, U., BTech (IT-BHU), M.S (Clemson), PhD (Purdue), PEng. Supply chain management, inventory and production planning, facility planning and design.

Assistant Professor

MacDonald, C., BEng (TUNS), PhD (Dal), PEng. Work design, manufacturing systems.

Adjunct Professors

Eiselt, H.A., Dip-kfm, Dr.rer.pol (Göttingen), (Faculty of Administration, University of New Brunswick, Fredericton, New Brunswick). Location theory, operations research.

Li, H., BSc (China), PhD (NC State). (Dept. of Mathematics, Mount St. Vincent). Queueing theory.

MacKay, K., (Dept. of Management Sciences, University of Waterloo), BMath, MSc, PhD (Waterloo). Production management, information systems.

Millar, H., BSc (UWI) MASc, PhD (TUNS), PEng. (Dept. of Finance and Management Science, St. Mary's University). Disaster recovery planning, fisheries operations, manpower scheduling, vessel routing, production operations.

Adjunct Associate Professor

Black, N., BASc (Waterloo), MASc (TUNS), PhD (UNB), PEng. (Dept. of Engineering, Univ. of Moncton). Ergonomics, musculoskeletal injury prevention, human biomechanical modelling, design for physical disabilities, work study.

I. Program Description

See Engineering section for Masters's and Doctoral program details.

II. Class Descriptions

IENG 6900.03: Industrial Engineering Methodologies.

This class gives an overview of industrial engineering methodologies with particular reference to classical industrial engineering and ergonomics. The subject areas covered include: work methods and measurement, engineering economics, plant layout and material handling and industrial ergonomics. Due emphasis will be given to the application of the methodologies in an industrial environment.
PREREQUISITE: This class is not intended for graduates of an Industrial Engineering undergraduate program.

IENG 6904.03: Industrial Work Systems Design.

This class deals with the improvement of work productivity and quality of industrial working life through optimum design of the job, workplace, work organization and work environment. Due emphasis will be given to integrate the essentials of classical industrial engineering, ergonomic, safety and socio-psychophysiological factors in developing such systems.

IENG 6906.03: Occupational Ergonomics.

Consideration is given to human's anatomical, physiological and psychological capabilities and limitations for systematic analysis, identification and evaluation of human-machine-environment systems to design consumer products, equipment, tools, and the workstation. Due emphasis will be given to the application of ergonomics principles and data at the human-machine interface in industrial and other occupational settings.

IENG 6908.03: Advanced Production I.

This class deals with planning the production system and covers the following areas: scale and size of production, plant location, plant layout, and materials handling.

IENG 6909.03: Advanced Production II.

This class deals with the operation and control of the production system and covers the following areas: quality control and inspection systems, scheduling and inventory control and location of warehouses.

IENG 6912.03: Introduction to Operations Research.

This class is a graduate level introduction to the fundamental ideas of operations research. The class focuses on mathematical modelling in deterministic and non-deterministic settings. The class covers topics in the theory and application of mathematical optimization, network analysis, decision theory, inventory theory, and stochastic processes including queuing processes. The class requires background in probability theory and linear algebra as well as some skill in computer programming.
PREREQUISITE: This class is not intended for graduates of an Industrial Engineering undergraduate program.

IENG 6916.03: Stochastic Processes.

This class is an introduction to the fundamentals of stochastic processes. Emphasis is placed on the analysis of the probability structure of stochastic models. Topics discussed include renewal processes, counting processes, Markov chains, Markov decision processes, birth and death processes. Stationary processes and their spectral analysis may also be discussed. Applications of stochastic processes in operations research, quality and reliability engineering are presented.

IENG 6917.03: Simulation of Industrial Systems.

Computer simulation of industrial systems, the design of discrete simulation models, and the generation of random variables are all covered by this class. Also included is the design of simulation languages. Applications of simulation models in decision making situations arising in production, distribution and economic systems are studied.

IENG 6918.03: Decision Analysis.

This class is an introduction to the fundamentals of rational decision-making, starting with a review of payoff and regret tables, as well as different decision-making situations and criteria. Topics discussed include the value of perfect and imperfect information, decision trees, utility theory, game theory, and Markovian decision models. Applications of decision analysis in operational research, production systems, quality engineering, insurance and financial planning are presented.

IENG 6920.03: Advanced Topics in Linear and Integer Programming.

The following topics comprise this class: linear programming, decomposition methods, integer programs, Gomory's algorithms, implicit enumeration, branch and bound, sequencing problem. Graphs and algorithms: Extensions of shortest path problems, their algebra. General flow problems including flows with gain and loss and multicommodity flow. Eulerian paths and Hamiltonian cycles. The Chinese Postman problem. Covering problems.
PREREQUISITE: IENG 4304.03 or equivalent.

IENG 6921.03: Nonlinear Optimization.

Key issues in engineering design are the optimization of the design parameters and optimization of overall system performance. The objective of this class is to expose the student to modern techniques in finite dimensional optimization. Topics in unconstrained optimization will include steepest descent, conjugate gradient and quasi-Newton methods. In the field of constrained optimization, topics will include Kuhn-Tucker theory and algorithmic methods such as reduced gradients, gradient projection, penalty and barrier methods. The use of constructive dual methods may also be included. Throughout the class, students will be encouraged to apply the theory to engineering decision problems.

IENG 6923.03: Distribution Management.

The class will explore the mathematical models in distribution management, and the relationship between theoretical advances and useful applications. The following topics will be covered: location problems, vehicle routing and scheduling with multiple constraints, dynamic routing & scheduling, implementation strategies. Students will be required to undertake a project in solving a distribution management problem.

IENG 6924.03: Capital Investment and Capacity Expansion Planning.

This class involves the use of appropriate decision models to examine problems of capital investment and capacity expansion planning. Single projects under various deterministic criteria, multiple projects with budgetary and non-budgeting constraints, and project selection under uncertainty are all considered. Various aspects of capacity expansion with growing markets and with economics of scale with be examined. Attention will be paid to the role of system operating cost models in making the capacity expansion decision.

IENG 6925.03: Queueing Theory and Its Applications.

This class deals with basic issues in queueing theory. The emphasis is on classical and modern queueing techniques as well as their applications. Besides elementary queueing systems, it also covers special queueing models that are widely applied in areas such as telecommunication networks, flexible manufacturing systems, computer performance evaluation and stochastic service systems. These models include priority queues, retrial queues, assembly line queues, and queueing networks.
PREREQUISITE: IENG 6916.03 or equivalent

IENG 6947.03: Dynamic Programming and Stochastic Control.

Dynamic programming is a methodology for modelling and optimally solving multistage decision problems. The methodology has broad applications in a variety of engineering and other fields. The class emphasizes both dynamic programming as a way of modelling and the numerical solution of the resulting dynamic programming models. The focus of the class is on discrete state, discrete time problems but continuous time and continuous state problems are also encountered. The class deals with both finite horizon and infinite horizon problems. In both cases, deterministic problems and various types of stochastic problems are examined.

IENG 6990.03: Directed Studies in Industrial Engineering I.

This class is offered to students enrolled in a Masters program in Industrial Engineering who wish to gain knowledge in a specific area for which no appropriate graduate level classes are offered. Each student taking this class will be assigned a suitable class advisor. The student will be required to present the work of one term (not less than 90 hours in the form of directed research, and individual study) in an organized publication format and may, at the discretion of the advisor, be required to take a formal examination.

IENG 7990.03: Directed Studies in Industrial Engineering II.

This class is offered to students enrolled in a PhD program in Industrial Engineering who wish to gain knowledge in a specific area for which no appropriate graduate level classes are offered. Each student taking this class will be assigned a suitable class advisor. The student will be required to present the work of one term (not less than 90 hours in the form of directed research, and individual study) in an organized publication format and may, at the discretion of the advisor, be required to take a formal examination.

IENG 9000.00: Master's Thesis/Project.

IENG 9530.00: PhD Thesis.

Information Management

Location: Kenneth C. Rowe Management Building
6100 University Avenue
Halifax, NS B3H 3J5
Telephone: (902) 494-3656
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Email: sim@dal.ca
Website: sim.management.dal.ca

Director of School

Black, F.A.

Administrative Staff

Balogh, S., Administrative Assistant
Dehmel, L., Secretary
Watson, J., MSLIS (Long Island University), MLIS Program Coordinator

Professors Emeriti

Dykstra Lynch, M., BA (Calvin), MLS (Dal), PhD (Sheffield)
Horrocks, N., O.C., BA (Western Australia), MLS, PhD (Pittsburgh), Fellow of the Library Association (UK), Associate of the Library Association of Australia

Professor

MacDonald, B.H., BSc (Acadia), MA, MLS, PhD (UWO). Diffusion and use of information by scientists/engineers, history of print culture, research methodology, bibliography of scientific/technical information.
Wheeler, D., BSc (Hons), PhD (Surrey) (cross-appointment from the School of Resource and Environmental Studies, and the School of Business Administration)

Associate Professors

Black, F.A., BEd (Aberdeen), MLIS (Dal), PhD (Loughborough). Print culture, GIS applications for historical research, professional development for information professionals
Moukdad, H., BA (Lebanese U), MA (Boston), MLIS, PhD (McGill). Information retrieval, multimedia development, multilingual Web searching
Spiteri, L., BA, MA (York), BEd (Toronto), MLIS (UWO), PhD (Toronto). Thesaurus construction, classification, indexing.

Assistant Professors

Blustein, J., BSc (Western Ontario), MSc (Western Ontario), PhD (Western Ontario) (cross-appointment from the Faculty of Computer Science)
Kelley, E., BA (Saint Mary's), MLS (Toronto), MBA (Saint Mary's), PhD (Saint. Mary's) (cross-appointment from the School of Business Administration)
Lawson, K., BA (Toronto), MA (York), PhD (Toronto)

Lecturers

Howard, V., BA, MA (UBC), MLIS (Dal), PhD candidate (Wales-Aberystwyth). Literature for children, literature for young adults, information behaviour.
Maes, W., AB (Gonzaga), MA (Calgary), MLS (UBC) (cross-appointment from Dalhousie University Libraries)
Toze, S., BA (Queen's), MLS (Toronto), PhD candidate (Dalhousie). Information use in corporate settings, professional competencies for special librarians.

Adjunct Professors

Horrocks, N., O.C.
Toms, E., BA, BEd (Memorial), MLS (Dal), PhD (UWO)
Vagianos, L.G., BA (Hiram College), MA (Suffolk), MSLS (Western Reserve), LLD (UPEI)

Associated Instructional Staff

Boxall, J., BA (Saint Mary's), BEd (Saint Mary's), MA, MLIS (Dal)
Harvey, K., BA (Dal), MA (Alberta), MLIS (Dal), PhD (Alberta)
MacDonald, J., BSc (MSVU), MLIS (Dal), PhD candidate (Sheffield)

Students seeking further information or help in planning classes of study in the School of Information Management should contact:

MLIS Program Coordinator
School of Information Management
Faculty of Management
Dalhousie University
Kenneth C. Rowe Management Building
6100 University Ave
Halifax, NS B3H 3J5

The goal of the Master of Library and Information Studies Program is to provide qualified candidates with graduate education which equips them for careers as leaders in the information professions.

The student is introduced to the development and significance of information management wherever it is practiced, to the underlying principles of the profession, and to the techniques of information organization, analysis, retrieval, and use. Each student is challenged to explore and question through a curriculum which attempts to balance professional studies with supervised practical experience and advanced academic study or individual research.

I. Admission Requirements/Deadlines

The School functions within the Faculty of Graduate Studies and its entrance requirements meet the standards of this Faculty. Candidates for the MLIS must hold a four-year Bachelor's Degree with at least a second class standing (B average, 3.0 GPA) from a university recognized by the Senate of Dalhousie University. An academic level of a high B+ (3.3 GPA) or better is generally held by successful applicants.

Although our application deadline is April 1, SIM accepts applications throughout the year. Early applications are strongly recommended.

The School admits students in September and January. The majority of students enter in September and the program is designed primarily for fall admission. January admissions are contingent on the total enrolment in September, and priority is given to applicants who transfer from another similar program, applicants with experience in the field, and/or applicants who wish to attend part-time.

Candidates whose mother tongue is NOT English are required to demonstrate a working and a reading knowledge of English. A TOEFL score of 600, 250 for computerized testing, or a score of 100 on the TOEFL Internet-based Test (TOEFL IBT) and 5.5 for the TWE, a MELAB score of 95, an IELTS score of 8.0, a CAEL score of 70, or the General Certificate in Education in the English Language at the Ordinary or Advanced Level are acceptable.

Application Deadlines

September Admissions

- March 1 — Deadline for scholarship consideration
- April 1 — Deadline for all Canadian and international applications

(All applicants are strongly advised to apply earlier)

January Admissions

- August 31 — Deadline for international applications
- October 31 — Deadline for Canadian applications

II. Degree Programs

A. Master of Library and Information Studies (MLIS)

The degree of Master of Library and Information Studies is awarded upon satisfactory completion of:

1. Sixteen half-credit classes --nine required courses and seven electives
2. INFO 0590 Practicum (i.e. work placement of 100 hours)
3. In addition, students are strongly encouraged to attend the array of professional, research and networking opportunities provided by the School and the broader Faculty of Management.

1. Two-Year Program

Full-time attendance during the Fall and Winter terms for two years.

2. Part-Time Program

The degree is to be completed within seven years. Each calendar year, a part-time student may take no more than five half-credit courses offered by Dalhousie University. In the first year a focus on required courses is beneficial and MGMT 5000 must be completed.

B. Master of Library and Information Studies/ Bachelor of Laws (MLIS/LLB)

This is a four-year program leading to the degrees of Bachelor of Laws and Master of Library and Information Studies. The usual order of the program is:
Year 1: first year classes of the MLIS program (7 required, 1 elective)
Year 2: First year classes of the LLB program
Year 3: Two MLIS classes (1 required, 1 elective); 25 hours of LLB classes
Year 4: 1 MLIS class each term; 23 hours of LLB classes

Candidates for the combined MLIS/LLB program must also satisfy the entrance requirements of the Faculty of Law. For further information, contact the MLIS Program Coordinator, School of Information Management and/or the Admissions Officer, Faculty of Law.

C. Master of Library and Information Studies/ Master of Business Administration (MLIS/MBA)

A three-year full-time course of study leading to the degrees Master of Library and Information Studies and Master of Business Administration. A total of 28 credits (12 MLIS and 16 MBA) are needed to complete the MLIS/MBA program along with a non-credit Practicum.

Applicants must gain separate and independent admission to both Schools. For further information contact the MLIS Program Coordinator or the MBA Admissions & Program Officer.

D. Master of Library and Information Studies/Master of Public Administration (MLIS/MPA)

A three-year full-time course of study leading to the degrees Master of Library and Information Studies and Master of Public Administration. A total of 27 credits (12 MLIS and 15 MPA) are needed to complete the MLIS/MPA program along with a non-credit Practicum.

Applicants must gain separate and independent admissions to both Schools. For further information contact the MLIS Program Coordinator or the MPA Graduate Coordinator.

E. Master of Library and Information Studies/Master of Resource and Environmental Studies (MLIS/ MREM)

This program leading to the combined degrees Master of Library and Information Studies and Master of Resource and Environmental Studies is pending approval. For further information, contact the MLIS Program Coordinator and/or the MREM Graduate Coordinator. Once approved, further information will be found on the School of Information Management website and the School for Resource and Environmental Studies website.

F. Master of Information Management (MIM)

The degree of Master of Information Management is pending approval. For further information, contact the School of Information Management Graduate Coordinator. Once approved, further information will be found on the School of Information Management website.

III. Class Descriptions

In the following list the required classes are numbered 0590, 5000, 5500-5570, 5590; 6000 classes are electives. All classes with the '0' prefix are non-credit; 7000 classes are experimental or occasional classes. Not all 6000 and 7000 level classes are offered each year. The curriculum has been organized with sufficient flexibility to allow students to pursue an individual research project, or to develop a subject specialty through reading classes or the thesis option.

SIM students are encouraged to take graduate-level courses offered outside SIM, and may take a maximum of four half-credit courses outside the School. Advance approval must be obtained from the course instructor and the MLIS Program Coordinator or the Director of SIM.

INFO 0590.00: Practicum.

Enables the student to test and evaluate class theory, to contribute by actual participation, and to explore areas of particular interest for class specialization and future employment. Placements are arranged in consultation with the MLIS Program Coordinator. (100 hours, Non-credit)

MGMT 5000.03: Management Without Borders: A Foundation Course for Masters Students in Management.

This class places management in its broadest context and helps students from diverse disciplines understand the complex social, economic, ecological, political and technological forces shaping 21st century leadership in the public, private and non profit sectors. Key themes explored in the course include systems thinking, values based approaches to management, and personal and professional development.
INSTRUCTOR(S): D. Wheeler

INFO 5500.03: Information in Society.

Provides an introduction to the economic, political, and social dimensions of an information-rich environment. Includes consideration of the historical development of library and information studies, knowledge production, issues of control versus free flow of information, the social organization of knowledge, and the ethical and legal aspects of information services.
INSTRUCTOR(S): L. Spiteri, B. MacDonald

INFO 5505.03: Applications for Information Management.

Introduces the principles of using application for information management, and the practical use of Web and database development tools as applications in information service environments. Also deals with the theoretical issues of creating, editing and maintaining Web sites and databases.
INSTRUCTOR(S): H. Moukdad

INFO 5515.03: Organization of Information.

Introduces the theory and applications of information organization. Primary topics include: describing and representing information in various media; subject classification theory and techniques; authority control; controlled vocabulary; indexing fundamentals; and relation of organization to information retrieval systems. Traditional, library-oriented and more recent computer-based techniques, tools, and theories are examined.
INSTRUCTOR(S): L. Spiteri

INFO 5520.03: Research Methods.

Introduces concepts, methods (both quantitative and qualitative), and the practices of research that are appropriate to library and information studies. Addresses the nature and uses of research, tools for research, handling of evidence, analysis and interpretation of findings, reporting of results, evaluation of published reports, and the management of research.
INSTRUCTOR(S): H. Moukdad

INFO 5530.03: Information Sources & Retrieval.

Offers both a theoretical and a practical introduction to information services. Discusses users and their information-seeking behaviors, major categories of reference resources and how best to match appropriate resources to the user via effective reference interviews. Explores evaluation techniques and uses of reference resources in various formats. Includes strategies of online searching both in specialized databases and the Web.
INSTRUCTOR(S): S. Toze

INFO 5570.03: Organizational Management & Strategy.

Introduces management theories and practices for organizational functions occurring in any type of information setting. Examines all elements involved in effective strategic planning, implementation and management including personnel, budgeting, and change management. Discusses evaluation methods for all information centre functions. Introduces techniques relevant for training and development issues, policy and procedure writing, requests for proposals (RFPs), etc.
INSTRUCTOR(S): F.A. Black
PREREQUISITE: INFO 5530.03

INFO 5590.03: Information Management Systems.

Covers the principles of systems analysis, as well as library management systems and modules, and project planning. Modules include acquisitions, public access catalogue, full-text access, circulation, non-print booking, etc. The class introduces fundamental concepts, and facilitates understanding of how automated systems are selected and managed for the benefit of professionals and patrons/clients.
INSTRUCTOR(S): K. Lawson
PREREQUISITE: INFO 5505.03, INFO 5515.03, INFO 5530.03, INFO 5570.03

INFO 6050.03: International Perspectives.

A study of the nature of library and information science from a global point of view. Analyzes library information services and systems in various countries and regions of the world, and explores information needs of different or ethnic groups.
INSTRUCTOR(S): H. Moukdad

INFO 6150.03: History of the Book.

Explores the history of the book from its early beginnings to its present manifestations. While greatest emphasis will be placed upon the history of the book from the mid-15th century to the present, the class will also discuss the history of important precursors of mechanical printing, and literacy, books, and manuscripts in the ancient and medieval periods.
INSTRUCTOR(S): B. MacDonald

INFO 6250.03: Services and Resources for Young Adults.

Introduces the social, intellectual and psychological nature of adolescence, with respect to reading, listening and viewing interests.
INSTRUCTOR(S): V. Howard

INFO 6300.03: Government Information Resources.

Examines the structures of governments and the ways in which they produce information for their own use and for the general public. Emphasis is placed on the nature and scope of Canadian, American, and British government information as well as information of intergovernmental agencies such as that of the United Nations. Acquisition, organization, access, use and evaluation of government information are considered.
INSTRUCTOR(S): S. Toze
PREREQUISITE: INFO 5530.03

INFO 6310.03: Resources for Business Intelligence.

Examines the value of information in a competitive environment from the perspectives of various types of business information, cost and management of information, developments on the Internet, and the role of governments. In addition, discerning client needs and packaging of information for client use are considered.
INSTRUCTOR(S): S. Toze
PREREQUISITE: INFO 5530.03

INFO 6320.03: Legal Literature and Librarianship.

An introduction to the major sources of Canadian legal information, and the fundamental principles, issues, and practices in law librarianship.
PREREQUISITE: INFO 5530.03

INFO 6330.03: Cataloguing and Classification.

Looks at the application of standards and rules to the construction of catalogues. The first half of the course focuses upon special problems in describing books, serials, maps, music, sound recordings, and static and dynamic visual images. The second half focuses upon the conceptual analysis of information sources, as well as the theory of subject headings and classification systems.
INSTRUCTOR(S): L. Spiteri
PREREQUISITE: INFO 5515.03

INFO 6350.03: Indexing and Abstracting.

Presents the principles of subject analysis and development of thesauri, as well as indexing and abstracting systems. Provides practice in the principles and methodologies used in thesaurus construction, periodical indexing, back-of-the-book indexing, Web indexing, abstracting, and automatic indexing and abstracting.
INSTRUCTOR(S): L. Spiteri
PREREQUISITE: INFO 5515.03

INFO 6370.03: Records Management.

A comprehensive introduction to the field of records and information management. Topics covered include: records creation, evaluation, maintenance and control; issues relating to the maintenance, storage and disposition of records; and electronic records management.
INSTRUCTOR(S): L. Spiteri
PREREQUISITE: INFO 5515.03

INFO 6450.03: Services and Resources for Children.

Examines the reading and viewing interests of children. Topics covered include a brief overview of developmental psychology, the history of children's literature, developing successful library programs for children and their caregivers, building the children's library collection, and enhancing children's visual literacy.
INSTRUCTOR(S): V. Howard

INFO 6500.03: Users and Services.

Explores both sides of the users and services equation, focusing on profiling specific user groups, exploring the methods and tools used in community analysis and service evaluation, and determining the manner in which a proper fit or match may be achieved.
INSTRUCTOR(S): V. Howard, S. Toze

INFO 6540.03: Database Management Systems.

Focuses on the theoretical and practical aspects of the process of relational database design. Topics covered include data modeling, the Entity-Relationship data model, data normalization, and structured query language. The database design process is covered from conceptualization to implementation.
INSTRUCTOR(S): H. Moukdad
PREREQUISITE: INFO 5505.03
CROSS-LISTING: BUSI 6516.03

INFO 6560.03: Collections Management.

Examines the principles and methods of building library collections in all types of libraries, including the formulation of selection policy, criteria for evaluating materials, and the relationship of the selection process to user requirements and to other library procedures. Includes the problem of censorship, the art of the book review, and the relationship of the publishing industry to collection development.
INSTRUCTOR(S): V. Howard

INFO 6590.03: Information Sources in Science and Technology.

Examines Canadian and international scientific and technical information, and considers the production, dissemination, access, organization, and use of the two types of information.
INSTRUCTOR(S): S. Toze
PREREQUISITE: INFO 5530.03

INFO 6600.03: Information Sources in the Humanities/ Social Sciences.

Examines the information requirements of the various disciplines in the humanities and the social sciences, and discusses the relevant information sources for each subject area.
INSTRUCTOR(S): V. Howard
PREREQUISITE: INFO 5530.03

INFO 6610.03: Information Policy.

Explores, in a graduate seminar setting, a range of issues currently facing information professionals and the effect of these issues on policy development. Discusses the roles of all levels of government, the private and not-for-profit sectors, and key individuals in developing policies which affect information creation, control, access, and use. Focuses on Canadian issues, and includes international affairs as appropriate to the information society.
INSTRUCTOR(S): S. Toze

INFO 6620.03: Electronic Text Design.

Examines the theories, techniques and processes used to create, structure, and deliver electronic text and the implications of e-text for the future role of libraries. Aspects covered include analysis of the electronic information environment, the preparation of source material, and methods of adding value to electronic text.
INSTRUCTOR(S): K. Lawson
PREREQUISITE: INFO 5505.03

INFO 6630.03: Designing Interaction with Information Systems.

Explores how technology affects human use, and examines the process from conception of an idea to design and evaluation, with a particular emphasis on Web-based activities.
INSTRUCTOR(S): E. Toms
PREREQUISITE: INFO 5505.03
CROSS-LISTING: BUSI 6525.03

INFO 6640.03: Electronic Access to Information.

Explores the principles and methods involved in the retrieval of information from online databases. Topics discussed include the organization and structure of online databases, the formulation of search strategies, the evaluation of the content and search interfaces of online databases, and the management of online search services.
INSTRUCTOR(S): L. Spiteri
PREREQUISITE: INFO 5515.03, INFO 5530.03

INFO 6650.03-6680.03: Academic Classes.

Available by arrangement with the Director.

INFO 6681.03: Geospatial Information Management.

This class will address issues associated with the effective management of spatial information resources. The nature of spatial information from paper to digital entities will be reviewed, as will the deployment of these resources within libraries and other information centers such as governmental and private sector organizations. The class will cover principles and practices associated with metadata, GIS, licensing, spatial information databases, map libraries and archives, spatial data infrastructures and web-based delivery of products and services, as well as other distributed systems such as geolibraries. This class is geared towards the information manager who seeks to understand how to deploy services associated with spatial information and how to effectively develop an enterprise approach to managing spatial information data. The class will also provide students with hands-on experience in using GIS and related technologies so as to be able to better understand how to deploy services.
INSTRUCTOR(S): J. Boxall
PREREQUISITE: INFO 5505.03 and INFO 5515.03

INFO 6682.03: Information Seeking Behavior.

This class will examine information seeking Behaviour in a variety of settings (health care, private and public organizations, academic institutions, etc.), individuals and groups information seeking and use in

these contexts, and the theories and models of information seeking Behaviour that explore and explain information Behaviour.
INSTRUCTOR(S): H. O'Brien
PREREQUISITE: INFO 5520.03 and INFO 5530.03

INFO 6700.03-6710.03: Reading Classes.

Provide students with the opportunity to develop a specific interest in the library/information studies field by studying an aspect of a topic in greater detail than is possible within an existing class, studying an area not currently covered by the curriculum, or conducting a research study or special project. Available by arrangement with the Director.

INFO 6750.03: Health Sciences Literature & Information Sources.

Introduces students to the concepts and practice of health science librarianship with particular emphasis on the various print and electronic reference sources in the health sciences.
INSTRUCTOR(S): J. MacDonald
PREREQUISITE: INFO 5530.03

INFO 6800.03: Archives.

Provides an overview of the issues and practices of archival science, with emphasis on Canadian approaches. Considers principles of acquisition, arrangement, description, reference and use of archival records, along with the management of archives and the relationship between archival work and other divisions of the information professions.
INSTRUCTOR(S): K. Harvey

INFO 6810.03: Information Literacy.

Introduces theories and practices of educating clients in information research skills. Concepts covered relate to the design, implementation, and evaluation of instructional programs for a wide variety of clients/patrons. Includes theories of learning and how these can be utilized for effective client instruction and education.
INSTRUCTOR(S): F. Black
PREREQUISITE: INFO 5530.03

INFO 6840.03: Digital Libraries.

Introduces the requirements and technologies of networked library systems. Follows the evolution of the digital library and its impact on information dissemination. Examines issues and trends influencing the development and structure of digital libraries.
INSTRUCTOR(S): H. Moukdad
PREREQUISITE: INFO 5505.03

INFO 6850.03: Special Topics in Information Management.

Builds on topics introduced in required courses, particularly those dealing with applications of information technology in information management. This class will take a more in-depth look at the major topics in the field. The content will change rapidly as the field progresses. Current topics include: information ethics, design of usable information systems, digital media, network design, electronic communication, software lifecycle management, and design of an information-based organization.
INSTRUCTOR(S): H. Moukdad
PREREQUISITE: INFO 5505.03

INFO 6880.03: Systems Analysis.

Introduces knowledge, skills, and techniques necessary for describing, analysing requirements, and designing the user-oriented aspects of information-technology-supported systems in organizations.
PREREQUISITE: INFO 5505.03, INFO 5590.03

INFO 7390.03: Quantitative Methods.

This class is designed to enable students to understand existing statistical analyses, as well as to conduct their own. Statistical analyses are presented with focus on application in the public sector, emphasizing the importance of statistical analysis in social research and policy making. Specific topics include descriptive and inferential statistics, measures of association for nominal and ordinal variables, analysis of variance techniques, as well as linear regression. In addition to the class, students are also offered tutorials in working with SPSS and MS Excel. Student assignments require work with large data sets.
PREREQUISITE: INFO 5520.03
CROSS-LISTING: PUAD 5140.03

INFO 9000.12: Thesis.

PREREQUISITE: Students who have achieved an A- or higher average in their first eight MLIS courses may consider the thesis option in lieu of four half-credit elective courses.

INFO 9001.06-9002.06: Thesis.

Available by arrangement with the Director. The Thesis Option replaces four of the School's electives.

INFO 9003.00: Thesis Continuing.

School Publications

- Dalhousie Journal of Interdisciplinary Management (http://djim.management.dal.ca/)
- *Inform*: *Newsletter of the School of Information Management* (annual)
- Occasional Papers Series (Contact the School for a list)
- *YA Hotline* (Irregular)
- *Épilogue*: *Canadian Bulletin for the History of Books, Libraries, and Archives*

Interdisciplinary PhD Program

Location: Faculty of Graduate Studies
Room 314, Henry Hicks Academic
Administration Building
Halifax, NS B3H 4H6
Telephone: (902) 494-2485
Fax: (902) 494-8797
Email: idphd@dal.ca
Website: www.dalgrad.dal.ca/interdisciplinary

Program Coordinator

Marche, S., Associate Dean, Faculty of Graduate Studies

Graduate Coordinator

Duffy, J., School of Business Administration

Graduate Secretary

Scott, M., Faculty of Graduate Studies

Interdisciplinary PHD

Information for Prospective Students

The **Interdisciplinary PhD Program** is designed to meet the needs of an increasing number of mature, experienced students for research opportunities which cut across disciplinary boundaries. In some cases, the research incorporates the insights of two or three traditional disciplines; in others the research itself is in an interdisciplinary field focused on the environment, health, education, administration, information, etc. Each program is customized to meet the needs of the student. Students take graduate classes across the Faculty and work with faculty members in existing PhD disciplines and in other areas. Candidates for the program must have achieved prior academic excellence. Before making application, prospective students must consult with faculty members in the related disciplines.

Students considering such a program must pay particular attention to the following aspects of interdisciplinary doctoral study:

1. The responsibility largely lies on students to organize a unique program of studies with their committee and in consultation with the Graduate Coordinator.
2. By the end of the first year in the program, a full committee of faculty members must be established. A student who is a Dalhousie faculty member must also have an external member on the committee. The committee will be responsible for supervising the student's overall program of study, including advice on funding, the setting and scheduling of comprehensive examinations, the development of a thesis proposal, the research, and the thesis-writing and defence.
3. The students must hold a first-class honours undergraduate degree and a research Master's degree, or acceptable equivalents.
4. The student should plan such studies in the context of an overall career goal to ensure that, as far as possible, the program will constitute a proper qualification for desired employment upon graduation.

Anyone wishing to pursue admission to the program should plan it within the framework of the following admission process.:

1. The student should develop, in consultation with at least one faculty member, a tentative program of proposed study, making sure that it: (a) is truly interdisciplinary, and (b) cannot be completed within the framework of an existing program.
2. The student, in consultation with the potential supervisor, should prepare a Statement of Interdisciplinary Research Interest.
3. The student should discuss the proposed program with appropriate faculty members and obtain written support from a supervisor and two committee members.
4. The Application forms are available from the Office of the Registrar or on the Web. Once transcripts, Statement of Interdisciplinary Research Interest, program proposal, three letters of reference, letters of support from proposed supervisor and committee members, and other supporting documentation have been received in the Faculty of Graduate Studies, the file is considered by the Graduate Faculty Interdisciplinary PhD Admissions Committee. **Please see the Interdisciplinary PhD Program website for application deadlines.**

Because the application process is a lengthy one, prospective students are advised to plan well in advance. Application for external funding by all eligible applicants is strongly advised. Limited university funding may be available.

Program Requirements

Preliminary class work will generally consist of 4-6 half-credit classes chosen from the graduate offerings of the Faculty and may include up to two directed reading classes. During the second year, comprehensive examinations should be written in fields appropriate to the topic of research. The number (no more than 3) and nature (written, oral, combination of written and oral, or project-based) are decided by the supervisory committee. As soon as comprehensives are passed the student should submit a written thesis proposal to the supervisory committee. Based on the written proposal and oral defense the committee decides that the student can begin the thesis. The finished thesis must be presented and orally defended in conformance with the Faculty of Graduate Studies procedures.

For more information contact the, Faculty of Graduate Studies, Dalhousie University, Halifax, Nova Scotia, Canada B3H 4H6. Telephone (902) 494-2485; Fax: (902) 494-8797; Email: idphd@Dal.Ca.

INTE 7000.03: Interdisciplinary Directed Studies.

INTE 7005.03: Research Directed Studies.

The purpose of this class is to provide all Interdisciplinary PhD students with an opportunity within their programs to concentrate on the development of a research proposal. Normally, the student would read broadly, prepare a bibliography of related work, prepare critical analyses of current work, and meet with the supervisor on a weekly basis. Each instance of this class would, however, be designed by the student and his or her supervisor to reflect the interdisciplinary nature of the individual program. The goal of this directed study class is for the student to formulate research questions that may be developed into the formal research proposal. The class would entail both written and oral contributions by the student.

INTE 7100.03: Research Methods from Management, Policy, and Science for Interdisciplinary Studies.

This class is designed to provide interdisciplinary students with a broad range of research method approaches from management, policy, and science perspectives. The goal is for the student to determine the research methods most appropriate for their thesis work and to be able to design simple to moderately complicated research studies including those for their dissertation. In addition, this course will provide the basis for critical reading of research findings in the literature.
INSTRUCTOR(S): Jack Duffy
FORMAT: Lecture/Discussion

INTE 7120.03: Advanced Qualitiative Methodologies For Interdisciplinary Studies.

Students will explore the underlying assumptions of qualitative paradigms and disadvantages of the five main qualitative methods. Students will learn to critique qualitative studies as well as design their own. Topics such as power and ethics will be woven into all the methodologies covered.
INSTRUCTOR(S): J. Duffy
FORMAT: Lecture/Seminar
PREREQUISITE: INTE 7100.03 or equivalent

INTE 9530.00: Doctoral Thesis.

PHDP 8000.00: Doctoral Comprehensive Requirement.

Following completion of class work, students will register in the Doctoral Comprehensive Requirement while they prepare for and continually until they have passed the Comprehensive Examination.

International Development Studies

Location: 3rd Floor, A&A Building Room 339
Halifax, NS B3H 4H6
Telephone: (902) 494-3814
Fax: (902) 494-2105
Email: idsgrad@dal.ca
Website: http://www.dal.ca/ids

Chair of Department

Black, D., MA, PhD (Dal)

Graduate Coordinator

Willis, O., MA (Dal), MSc (Leicester), PhD (Kwazulu-Natal)

Being interdisciplinary in nature and structure, the program draws on a wide selection of faculty who teach and research in development studies and related fields. The following is a list of faculty who contribute to the program.

Please consult individual departmental/school entries for faculty member research interests.

Professors Emeriti

Parpart, J.L., (International Development Studies/History)
Thiessen, V., (Sociology & Social Anthropology)

Faculty

Adl, S., (Biology)
Arthur, P., (Political Science)
Barkow, J.H., (Sociology & Social Anthropology)
Binkley, M.E, (Sociology & Social Anthropology)
Black, D., (Political Science, International Development Studies)
Boardman, R., (Political Science)
Cameron, J., (International Development Studies)
Chatt, A., (Chemistry)
Chircop, A., (Law/Marine Affairs)
Cohen, F., (Environmental Studies)
Corke, S.-J., (History)
DuBois, L., (Sociology & Social Anthropology)
Fierlbeck, K., (Political Science)
Finbow, R.G., (Political Science)
Fitting, E., (Sociology & Social Anthropology)
Gahagan, J., (School of Health and Human Performance)
Gardiner Barber, P., (Sociology & Social Anthropology)
Glazebrook, T., (Philosophy)
Guppy, S., (Planning)
Harvey, F., (Political Science)
Jackson, L., (School of Health and Human Performance)
Karabanow, J., (Maritime School of Social Work)
Kirk, J.,(Spanish)
Kynoch, G., (History)
Lane, P., (Biology)
Lesser, B., (Economics)
Mannathukkaren, N., (International Development Studies)
McNiven, J., (Business Administration)
Mopoho, R., (French)
Murphy, C., (Sociology & Social Anthropology)
Noble, B. (Sociology & Social Anthropology)
Oakley, R.,(Sociology & Social Anthropology)
Palermo, F., (Planning)
Poulton, M., (Planning)
Sagebien, J., (Business Administration)
Saunders, P., (Law)

Sullivan, K., (Public Administration)
Tiessen, R., (International Development Studies)
Tirone, S. (Health & Human Performance)
Ulicki, T., (International Development Studies)
VanderZwaag, D., (Law)
Wainwright, J.A., (English)
Wheeler, D. (Management)
Willison, M., (Biology)
Wright, T., (Environmental Programs)
Zachernuk, P., (History)

Adjunct Professors

Barber, B.
Barbosa, R.
Conley, M.
Harker, J.
Kamra, O.P.
McAllister, R.I.
O'Malley, A.
Simms, C.
Sinclair, A.M.
Shaw, T.
Tharamagalan, J.
Zurbrigg, S.

I. Master of Arts

An interdisciplinary masters degree by class work and thesis which focuses on problems of and prospects for development in the countries and communities of the global South.

The program brings together Dalhousie's considerable resources in development studies - individual, institutional and informational. We offer an innovative degree program based on established graduate classes in cooperation with the activities of development studies centres on campus, particularly the undergraduate International Development Studies program and the Lester Pearson International Institute. The degree draws heavily, though not exclusively on classes and supervisors in Economics, History, Political Science and Sociology and Social Anthropology. It is offered by the Faculty of Graduate Studies through the International Development Studies Department and has limited enrollment per annum.

This degree exists as an interdisciplinary offering with the following requirements:

1. One-half credit in theory
2. One-half credit in methods
3. One-half credit in practice
4. Out of the six half-credit classes at least two half-credits should be taken in different disciplines
5. The masters thesis normally counts as two full-year classes;
6. Thesis readers are normally drawn from at least two departments; one of the three committee members may come from outside of Dalhousie.

The degree is available on a full and part-time basis. Students are also encouraged to participate actively in the non-credit seminar programs of the Lester Pearson International Institute and IDS/IDA and other development studies centres on campus and in Halifax. Saint Mary's University offers a similar MA, permitting students from both campuses to take a broader range of offerings and participate in a wider range of events. The MA at Dalhousie is designed to be complementary to and require the same standards as related degrees, such as the masters in History, Political Science, and Sociology & Social Anthropology, Development Economics, International Business, Marine Management and Environmental Studies.

A. Application and Admission

Candidates for admission to the masters degree in International Development Studies should hold an honours degree or equivalent, from a university of recognised standing, in either International Development Studies or a relevant discipline (including, for example, business, economics, environmental studies, history, law, political science, public administration, or sociology and social anthropology) or have completed at least four senior undergraduate classes in one of these disciplines. All candidates for admission must meet the requirements of the Faculty of Graduate Studies.

Some candidates may complete the requirements in a 12-month period of full-time study. However, in most cases completion of the thesis will take more than the 12 month period and will involve payment of continuing fees for any additional academic terms of registration. Candidates who do not meet the minimum admission requirements may be admitted to a preliminary Qualifying Year of study based on the established honours year in the undergraduate IDS program, after which they must reapply for admission. Classes taken during such a qualifying year do not count towards the master's degree requirements. Both undergraduate and graduate IDS classes are available in Summer School as well as the regular academic year.

Application forms, obtainable from the Registrar's Office, should be returned along with supporting documents, including an example of written work and a statement of educational and professional goals, by April 1 for overseas applicants and June 1 for North American applicants at the very latest. Early application is especially recommended for foreign candidates who will need to arrange student visas; i.e. by January 31. Also, students wishing to be considered for scholarship support are strongly encouraged to submit completed applications before January 31.

Candidates from outside Canada whose native language is other than English must demonstrate their capacity to pursue a masters program in English. They should submit the results of a TOEFL or other standard English competency test at the time of application. The minimum TOEFL score required is 580 (computerized TOEFL score required is 237).

B. Program Requirements

Candidates for the Master's Degree in International Development Studies are expected to complete a course of study beyond the honours undergraduate level worth at least 10 half-credits; normally six half-credits by class work and four half-credits by thesis. At least one full class and one thesis reader must come from a discipline other than the primary one and every student must take appropriate half-classes in theory, in methods and in practice. Candidates are also encouraged to take appropriate graduate classes in Summer School. Full-time students with appropriate interdisciplinary and development studies backgrounds may complete the degree through a one-year residency; part-time students may complete the requirements over a three-year period. The thesis will conform to graduate studies regulations and will normally be presented and examined orally in public.

C. Administration

The interdisciplinary MA in International Development Studies is administered by a committee of faculty who teach and research in the area of development studies chaired by a coordinator who acts as the graduate admissions/advising officer for the program. Normally, major participating departments will be represented on the committee, which will liaise with the undergraduate IDS committee at Dalhousie and the Saint Mary's University IDS committee.

II. Classes Offered

NOTE: Some of these classes may require prerequisites: see departmental rules. Not all classes are offered every year. Please consult individual department/school entries for class descriptions.

Biology

BIOL 5060.03: Environmental Ecology
BIOL 5065.03: Sustainability and Global Change
BIOL 5160.03: Political Ecology

Business Administration

BUSI 6803.03: International Transportation
BUSI 6807.03: International Financial Management
BUSI 6808.03: International Banking
BUSI 6815.03: Doing Business Effectively in Asia-Pacific Region
BUSI 6819.03: Marketing Under NAFTA

Economics
ECON 5250.06: Applied Development Policy, Practice and Economics
ECON 5251.03: Seminar in Development Studies
ECON 5252.03: From Disaster Relief to Development
ECON 5431.03: International Finance
ECON 5516.03: Resource and Environmental Economics I (Resources)
ECON 5517.03: Resource and Environmental Economics II (The Environment)
ECON 5522.03: Labour Economics I
ECON 5523.03: Labour Economics II
ECON 5582.03: Applied Class in Development Policy & Practice

English
ENGL 5918.03: The Politics of Representation

Environmental Studies
ENVI 5000.06: Introduction to Environmental Studies
ENVI 5020.03: Resource Systems and Economic Development
ENVI 5030.03: Seminar on Managing for Sustainable Development
ENVI 5031.03: Environmental/Ecological Economics
ENVI 5035.03: Research Methods
ENVI 5041.03: Environmental Education
ENVI 5120.03: Environmental Ecology

Gender and Women's Studies
GWST 6010.03: Theories of Feminism
GWST 6020.03: Feminist Methodologies

Health Services Administration
HESA 6370.03: International Comparative Funding and Insurance Systems

History
HIST 5320.03: Empowerment, Gender, and Development
HIST 5430.03: The Making of Colonial Africa (1850-1930)
HIST 5435.03: Rise and Fall of African Slavery
HIST 5452.03: South Africa Since 1860
HIST 5461.03: Gender and Development in Africa
HIST 5462.03: African Economic History
HIST 5470.03: Wars & Revolutions in 19th Century Africa
HIST 5475.03: African Intellectuals and the Modern Experience

International Development Studies
INTD 5000.03: Advanced Topics in Development Studies
INTD 5001.03: Readings in International Development Studies
INTD 5002.03: Graduate Seminar in Research Design for Development Studies
INTD 5003.03: Special Topic in International Development Studies
INTD 5004.03: Special Topic in International Development Studies
INTD 5320.03: Empowerment, Gender & Development
INTD 5600.03: Gender and Development

Law
LAWS 5022.03: Law of the Sea
LAWS 5051.03: International Environmental Law
LAWS 5056.03: International Trade Law
LAWS 5068.03: Ocean Law & Policy: International Fisheries
LAWS 5200.03: Environmental Law

Marine Affairs
MARA 5001.06: Contemporary Issues in Ocean Management & Development
MARA 5003.03: Marine Science & Technology
MARA 5008.03: Integrated Maritime Enforcement

Political Science
POLI 5302.03: Comparative Development Administration
POLI 5303.03: Human Rights & Politics
POLI 5315.03: African Politics
POLI 5340.03: Approaches to Development
POLI 5345.03: Politics of Southern Africa
POLI 5350.03: Governance & Globalization
POLI 5360.03: Politics of Latin America
POLI 5475.03: Democratic Theory
POLI 5531.03: UN in World Politics
POLI 5535.03: New International Division of Labour
POLI 5537.06: Management and Conservation of Marine Resources (Summer Only)
POLI 5540.03: Foreign Policies in the Third World
POLI 5560.03: Human Development/Security at the Start of the Twenty-first Century
POLI 5581.03: Diplomacy and Negotiation
POLI 5585.03: Politics of the Environment

Public Administration
PUAD 6500.03: Business & Government
PUAD 6520.03: Program Evaluation Seminar
PUAD 6521.03: Program Evaluation Practicum
PUAD 6550.03: Design & Use of Projects
PUAD 6555.03: The Impact of Technology & Public Administration
PUAD 6620.03: Women, Men & Management

Social Work
SLWK 6333.03: Practice Research
SLWK 6365.03: Community Socio-Economic Development
SLWK 6385.03: Community and Social Change Analysis
SLWK 6390.09: The Theory and Practice of Community Work

Sociology & Social Anthropology
SOSA 5001.03: Survey Methods
SOSA 5002.03: Social Statistics
SOSA 5003.03: Contemporary Perspectives in Ethnography
SOSA 5004.03: Advanced Issues in Work, Industry, and Development
SOSA 5005.03: Advanced Issues in Social Injustice and Social Inequality
SOSA 5006.03: Advanced Issues in Health and Illness

Urban & Rural Planning
PLAN 5101.03: History and Theory of Planning
PLAN 5102.03: Planning Practice
PLAN 5103.03: Qualitative Methods
PLAN 6101.03: Urban Design
PLAN 6102.03: Urban Economics
PLAN 6103.03: Urban Ecology
PLAN 6104.03: Comparative Urbanization
PLAN 6106.03: Transportation Planning
PLAN 6107.03: Regional Planning
PLAN 6110.03: Environmental Impact Assessment in Social and Environmental Policy

Internetworking

Location: Internetworking Program
Dalhousie University
1360 Barrington St., Room A210
Halifax, NS
B3J 1Z1
Telephone: (902)494-1114
Fax: (902)494-2057
Email: internet.eng@dal.ca
Website: http://internetworking.engineering.dal.ca

Program Director

Robertson, W., BSc (Eng Hons), MSc (Aberdeen), PhD (TUNS), PEng

Instructors

Artimy, M., BSc (Al-Fateh), MA Sc (Dalhousie), PhD (Dalhousie)
Bodorik, P., BSc (Calgary), MEng, PhD (Carleton)
Fenton, G.A., BEng, MEng (Carleton), MA, PhD (Princeton), PEng
Ilow, J., BSc (Poland), MASc, PhD (Toronto)
MacDougall, B., BEng (McGill), MBA (Queens), PEng, CCIE
Phillips, W.J., BSc (Eng), MSc (Queen's), PhD (UBC)
Sivakumar, S.C., BEng (Bangalore), MASc, PhD (TUNS), PEng
Srinivas, S., BEng (Bangalore), PhD (Inst. of Science, Bangalore)

I. Introduction

Internetworking is an area of growing significance and importance in today's world. It is a truly multidisciplinary area which requires knowledge of, and skills in, the related areas of engineering, communications, mathematics and modelling, computer and network architectures, and computer software. The program is truly unique being the result of a partnership between Dalhousie, Cisco Systems Inc., Nortel Networks, and the Telecomm Applications Research Alliance (TARA). The program was designed in collaboration with industry and was launched in September 1997. The laboratories are also unique and are probably the most up-to-date internetworking laboratories available anywhere for a Master level degree.

II. Program Classes

The classes are continually under review and are shown here as they were at the time of going to press. The order of presentation is updated regularly on the Web page. Students are normally required to take classes in the pre-requisite order given on the Web page. A project is not mandatory and registration requires departmental approval.

Any new proposed courses will be posted on the program Website once approved by the university. In addition to classes, all students are required to present a technical seminar. Registration is required for the seminar in the summer term.

NOTE: Completion of any or all engineering classes offered by the Department does not qualify persons to hold the designation "Professional Engineer" as defined by various Provincial Acts governing the Engineering Profession.

INWK 6111.05: Introduction to Computer Networks.

This class offers a general introduction to computer networks. It explores the structure, goals, services and problems of computer networks. The structure of computer communications is examined using the Open Systems Interconnection (OSI) seven layer protocol model. The purpose of each layer is discussed from both conceptual and practical aspects, and data communication standards are examined in terms of their layered structures. The distinction between circuit and packet switching is highlighted, and client server distance applications are discussed.
EXCLUSION: EINE 5101.03, INWK 5101.03, 6101.03

INWK 6112.05: Physical and Datalink Standards and Protocols.

This class covers issues relating to the physical and datalink layers of data communications networks. A review of basic digital communication theory is given, including modulation and demodulation techniques and their performance in noise and under bandwidth constraints. Physical layer standards of several wireline-based protocols are examined, and optical and wireless channels are also considered. Media access control techniques, framing structures, and error control procedures of several protocols are investigated.
EXCLUSION: EINE 5102.03, INWK 5102.03, 6102.03

INWK 6113.05: Telecommunication and Wide-Area Networks.

This class presents an overview of the technologies used in present telecommunications systems and wide area networks. Standard telecommunication transport and signalling standards are introduced. The Integrated Services Digital Network and broadband access alternatives are discussed. Wireless standards for cellular and satellite systems are considered, and emerging personal communication services are introduced.
EXCLUSION: EINE 5103.03, INWK 6103.03

INWK 6114.05: Internet Communication Protocols.

This class provides an in-depth coverage of the Transmission Control Protocol/Internet Protocol (TCP/IP) protocol stakc suite, including IP and protocols for address resolution, internet control, routing, broadcasting and multicasting. End-to-end communication issues associated with TCP will be discussed. Network management and domain name systems will be covered. Applications including telnet, file transfer, and simple mail transfer protocols will be covered in detail.
EXCLUSION: EINE 5104.03, INWK 5104.03, 6104.03

INWK 6115.05: Network Architecture.

This class covers the design of network architecture protocols the placement of servers and monitors, and firewalls. Internetworking, bridging, routing, and encapsulation are covered. Algorithms for bridging and routing are examined.
EXCLUSION: EINE 5105.03, INWK 5105.03, 6105.03

INWK 6117.05: Emerging Internetworking Technologies.

The primary focus of this class is to provide a comprehensive coverage of the major developments that lay the foundation for the next generation high performance networks. The student will study, the emerging technologies, design alternatives, and the underlying theory and practice required for the Internet to grow beyond a best effort dat delivery service to become a reliable and multi-service environment.
EXCLUSION: INWK 5107.03, 6107.03

INWK 6119.05: Network Security.

The primary objective of this course is to provide a comprehensive coverage of the theory, concepts, design principles and technologies for network security. The course focuses on the design principles and techniques of two major aspects of network security: (a) how to secure a network; and (b) how to secure data transactions.

INWK 6211.05: Mathematics for Internetworking.

This class includes a review of Probability and Statistics, data collection and distribution fitting. Markov chains, reliability, Markov Chains, stochastic processes and queuing systems, random number generators, sampling from various probability distributions, Monte Carlo simulation.
EXCLUSION: EINE 5201.03, INWK 5201.03, 6210.03

INWK 6411.05: Real Time Programming for Internetworking.

The objective of this course is teach the student the fundamentals of real time programming for internetworking. Topics covered include message queuing, resource sharing, priority assignments, event flags, interrupts, device handling, and protocol stack techniques.
EXCLUSION: EINE 5401.03, INWK 5401.03, 6401.03

INWK 6800.00: Internetworking Seminar Topic.

Students are required to research and present a seminar on an Internetworking topic.
INSTRUCTOR(S): Wm. Robertson
FORMAT: Seminar

INWK 6801.00: Internetworking Seminar Continuance.

Students are required to research and present a seminar on an Internetworking topic.
FORMAT: Seminar

INWK 6900.00: Project Continuance.

EXCLUSION: INWK 5900.00

INWK 6911.05: Project.

The student will be required to analyze the performance of a network and either design a new network or an upgrade to an existing network. The project should preferably be undertaken with an industrial company.
EXCLUSION: EINE 5901.03, INWK 5901.03, 6901.03

INWK 6912.05: Network Design.

The objective of this course is to provide a solid foundation for the design principles for the design of networks at all levels. The course focuses on the design principles and techniques for total network design from initial planning to management issues.

Law

Location: Weldon Law Building
6061 University Avenue
Halifax, NS B3H 4H9
Telephone: (902) 494-3495
Fax: (902) 494-1316
Website: http://law.dal.ca/Propective_Students/

Dean, Faculty of Law

Saunders, P.M., BA, MA, LLB (Dal)

Associate Dean, Academic

Deturbide, M., BSc (Dal), BJ (King's), LLB, LLM (Dal). Corporate Law, Commercial Law, Media Issues, Entertainment Law, Environment and Business

Associate Dean, Graduate Studies and Research

Devlin, R.F., LLB (Queen's, Ireland), LLM (Queen's, Ont). Jurisprudence, Legal Ethics, Judicial Education, Contracts

Professors Emeriti

Charles, William H., Q.C., BA (Sir Geo Wms), LLB (Dal), LLM (Harvard), LLM (Mich)
Wiktor, C., LLM (Wroclaw), MS (Col)

Professors

Archibald, B.P., BA (King's), MA, LLB (Dal), LLM (Col). Criminal Law and Procedure, Evidence, Comparative Law, Prosecutions Policy, Labour Relations Law
Black, V., BA, MA (Carleton), LLB, (Toronto), LLM (Calif, Berkeley). Private International Law, Torts, Commercial Law.
Chircop, A.E., BA, LLD, LLM (Malta), JSD (Dal). Marine and Environmental Law and Policy, Coastal and marine Management, Education and Training
Coughlan, S.G., BA (Ottawa), MA (Toronto), LLB (Dal), PhD (Toronto), Criminal Law and Procedure
Downie, J.G., BA, MA (Queen's), MLitt (Cambridge), LLB (Toronto), LLM, S.J.D. (Mich). Health Law; Policy & Ethics; Legal Ethics
Girard, P.V., BA (Brock), LLB (McGill), LLM (Cal, Berkeley), PhD (Dal). Legal History, Comparative Law, Property Law
Kaiser, H.A., BA, LLB (Dal), LLM (LSE). Criminal Law and Procedure, Mental Disability Law
Kindred, H.M., LLB (Bristol), LLM (London), LLM (Illinois). Public International Law and Maritime Law (Carriage of Goods by Sea)
MacKay, A.W., BA (MtA), MA (Florida), BEd (MtA), LLB (Dal). Human Rights, Administrative Law, Constitutional Law, Civil Liberties
McConnell, M.L., BA (Victoria), LLB (Dal), PhD (Sydney). Business and Environment, Feminist theory, International and Environmental Law
Pothier, D., BA (Dal), MA (Carleton), LLB (Dal). Constitutional, Labour, Human Rights, Equality and Disability Issues
Thomas, P., LLB (Wales), LLM (Yale). Family, Divorce, Fostering, Separation, Children, Contracts, Banking, Negotiable Instruments, Mediation and Negotiation
Thompson, D.A., BA (McGill), LLB (Dal). Family Law, Evidence, Children and the Law, Clinical Law
Thornhill, E.M.A., BA, Dip Ed (McGill), LLB (UQAM), Dip Int'l & Comp Law (San Diego), MA (Montreal), LLD (CUNY), LLD (Concordia). Critical race theory, human rights, international law, black history, black women's studies, anti-racist pedagogy
VanderZwaag, D., BA (Calvin), MDiv (Princeton), JD (Arkansas), LLM (Dal), PhD (University of Wales). Environmental Law, Ocean Law and Policy
Woodman, F.L., BA (Dal), LLB (Queen's). Tax and Social Policy, especially regarding Women and Children, Estates and Trusts

Associate Professors

Aylward, C., BA, LLB, LLM (Dal). Criminal Law, Critical Race Theory, Litigation, Legal Ethics
Bankier, J.K., BA (Toronto), LLB (Osgoode). Women and the Law, Law and Technology, Intellectual Property
Evans, R.L., BA (Toronto), LLB (York)
Gibson, E., LLB (Sask.), LLM (Toronto). Family Law, Tort Law, Health Law
Ginn, D., BA (Mt.A), LLB (Queen's), LLM (Osgoode). Property Law, Administrative Law, Gender, Health Law
Llewellyn, J., BA (McMaster), MA (Queen's), LLB (Toronto), LLM (Harvard). Restorative Justice, Legal Theory, Constitutional Law
Murphy, R. A., BA (UPEI), LLB (Dal), LLM (Toronto), SJD (Harvard). Constitutional Law, Evidence, Legal Theory
Russell, D., BA (St. Thomas), LLB (Dal), LLM (Cambridge). International Law, Law of Sea, Maritime Boundary Delimitation, High Seas Fishing
Saunders, P.M., BA, MA, LLB (Dal). Environmental Law, Law of the Sea, International

Assistant Professors

Bradley, S., BSc (Toronto), LLB (Queen's), LLM (Harvard)
Currie, R., BA (St. F.X.), MA (Careleton), LLB (Dal), LLM (Univ of Edinburgh)
Doelle, M., BSc, LLB (Dal), LLM (Osgoode), JSD (Dal). Environmental Law, Climate Change
Hadskis, M., BSc, LLB (Dal), LLM (York)
Khimji, M., LLB (Bristol), LLB (Windsor), LLM (LSE). Corporate and Commercial Law
Lahey, W., BA (MtA), BA (Juris., Oxford), LLM (Toronto). Administrative Law, Health Law
MacIntosh, C., BA (Concordia), MA (Alberta), LLB (Osgoode). Aboriginal Law, Immigration Law
Oguamanam, C., LLB (Ife, Nigeria), BL (Nig. Law School), LLM (Lagos), PhD (UBC). Intellectual Property
Wildeman, S., BA (Toronto), MA (Columbia), LLB (Dal). Mental Health Law, Administrative Law, Legal Theory

Adjunct Professors

Cromwell, T., BMus (Queen's), LLB (Queen's), BCL (Oxford)
Dobrowolsky, A., BA (Toronto), MA (Dal), PhD (Carleton)
Winham, G., BA (Bowdoin), Dip Int Law (Manchester), PhD (N Carolina)

I. Degree Programs

A. Master of Laws (LLM)

An intensive graduate program in law leading to the Master of Laws degree is offered to well-qualified candidates by the Faculty of Law of the University. The program is primarily intended for professional specialists and prospective law teachers. The program may consist of either a combination of class work, seminars and a thesis, or a combination of class work and seminars involving substantial written papers. In either case the program can be taken on a full-time basis over one full academic year, or on a part-time basis over two full academic years. Applicants who plan to take the degree on the basis of class work, seminars and a thesis are required to submit outlines of their proposed thesis topic at the time of the application. Thesis topics may concentrate on any area of law in which faculty supervisors and library resources will support original work. In recent years, thesis supervision has been provided in the following fields, among others: international law, administrative law, labour law, constitutional law, commercial law, tax law, tort law, criminal law and restorative justice, family law, health law, law of the sea, maritime law, and environmental law.

1. Admission Requirements

Applicants for admission to the LLM program should hold a first degree in law equivalent to the Dalhousie LLB, passed with at least a "B" average (or Upper Second Class Honours). The ability to conduct independent research and to work easily in the English language is a prerequisite for admission. Candidates from outside Canada whose native language is other than English will be required to pass an English language proficiency test (TOEFL 600/250).

2. Residency Requirements

The degree may be taken on the basis of either one academic year (September 1 to August 31) of full-time residence at Dalhousie, or two academic years of part-time residence at Dalhousie, after registration for the LLM degree. (It should be noted that the two-year residence requirement for part-time candidates differs from that required elsewhere in the calendar of the Faculty of Graduate Studies.)

3. Class Requirements

The degree may be taken on the basis of either class work, seminars and a thesis, or class work and seminars only. Applicants are required to indicate at the time of formal application on which basis they would prefer to take the degree, but the Graduate Studies Committee of the Faculty of Law, at the time an offer of a place is made, will decide on which of the two alternative bases a place is offered. The availability of places for the thesis alternative is governed by the availability of adequate faculty supervision and library resources. All class work for the degree, whichever of the two alternative bases is decided upon, must be completed with no grade below B-. Graduate students taking classes that are normally evaluated by an examination are required to complete a research paper or other written assignment, as agreed with the instructor, in place of the examination. Graduate students taking classes that are evaluated by a "major paper" must submit a paper of appropriate scholarly quality which will normally be between 40 and 50 pages in length (including text, and endnotes or footnotes).

All candidates for the degree are required to take a graduate seminar especially designed for our graduate students in law. This seminar is given in the fall term (and early part of the spring term) and requires from the student a comprehensive class presentation based on a substantial written paper. Some students who have not had previous exposure to Jurisprudence may be required to take a graduate jurisprudence class.

If the degree is taken by class work, seminars and thesis, a candidate is required to (a) in addition to the graduate seminar, complete at least two additional one-term classes from the class and seminar offerings of the Faculty of Law (the choice of classes to be determined by the Law School's Graduate Studies Committee), and (b) present a well-researched substantial thesis of scholarly quality produced under the continuous supervision of a member or members of the law faculty.

Such a thesis would normally be 150-300 typescript pages in length (double-spaced). Six copies of the thesis must be submitted to the supervisor on or before the dates given in the Law School's "Guidelines for Supervision and Evaluation of Graduate Students" (normally August 10 to meet deadlines for fall convocation). The thesis requirements and regulations of the Faculty of Graduate Studies must be met. Theses are usually supervised by a two person committee comprised of a supervisor and a reader or, in certain circumstances, two co-supervisors. Theses are examined by an examination committee comprised of the supervisory committee, an "arm's length" examiner and a chairperson, who is normally the Chair of the Graduate Studies Committee/Graduate Co-ordinator. A thesis may be graded as falling within one of the following categories: approved as submitted; approved upon specified corrections being made; failed, but with permission to submit a revised thesis; or failed outright.

If the degree is taken by class work and seminars without thesis, in addition to the graduate seminar, candidates are required to take at least an additional five one-term classes from the advanced class work and seminar offerings of the Law Faculty considered to be suitable as graduate classes and seminars by the Law Graduate Studies Committee. Of those five classes, at least three must be designated as "major paper classes" by the Faculty of Law, or be approved by the Graduate Studies Committee as having a substantial written component. In the remaining classes, the student will be evaluated by means of a substantial research-based written assignment, normally 25-30 pages, or equivalent assignment(s).

At the discretion of the Graduate Studies Committee of the Faculty of Law, a candidate may be required to submit to an oral examination by the Committee or its nominees in the field of the thesis or that of any written paper presented by the candidate. The Graduate Studies Committee of the Faculty of Law may recommend the substitution of not more than two

seminars or graduate level classes in a discipline other than law, which may be highly relevant to the candidate's thesis topic or area of specialization, provided that any such substituted class or seminar has, in the opinion of the Committee and the Dean of Graduate Studies, equivalence to the law classes being substituted.

Before deciding on the class work and seminars, or class work, seminars and thesis option, candidates who are contemplating future doctoral studies should note that some doctoral programs may require the completion of a Master of Laws degree which includes a thesis.

4. General

The Graduate Studies Committee of the Faculty of Law may at any time require any candidate for the degree to show cause, in such manner as it may determine, why such candidate should be permitted to continue his or her candidacy.

It should be noted that candidates taking the degree on a part-time basis are not eligible for graduate scholarships.

A student is required to comply with the directions of the supervisor and the decisions of the Graduate Studies Committee of the Faculty of Law, as well as the rules and regulations of the Faculty of Graduate Studies.

A full description of programs available in the Law School which may be of relevance to graduate students can be found in the general Law School Calendar and in its class selection materials.

B. Doctor in the Science of Law Degree (JSD)

An advanced graduate program in law leading to the JSD (Juris Scientiae Doctor) degree is offered to a very limited number of highly qualified candidates by the Faculty of Law of the University. Applicants who meet the admission requirements are invited to submit a detailed outline of their proposed thesis and a detailed description of their research plans with their application forms. Such topics will have to be limited to those areas of law for which faculty and library resources will support original work. It is expected that such resources will normally be available in marine law, environmental law, international law, comparative law, health law, law and technology, and public law/jurisprudence.

1. Admission Requirements/Deadline

Applicants for admission to the JSD program must have demonstrated superior academic ability during their previous legal education. Normally it will be necessary to have (i) attained at least the equivalent of a Dalhousie A- average grade at the LLB level and (ii) completed successfully a Master's degree in law. Preference will be given to applicants with established credentials in published scholarship of a professional calibre. The ability to conduct independent research and work easily in the English language is a prerequisite for admission. Foreign candidates are required to pass the TOEFL (Test of English as a Foreign Language) to the satisfaction of the Graduate Studies Committee of the Faculty of Law prior to admission. **Applicants seeking JSD funding from Dalhousie University should ensure that their completed applications are received by the University no later than January 1 of the year in which they intend to commence their studies.**

2. Residency Requirements

Applicants must be prepared to spend at least one full academic year (12 months) in continuous residence at Dalhousie after registration for the JSD program. The Graduate Studies Committee of the Law School reserves the right in certain cases to require the completion of a second year of residency. It is to be noted, however, that consistent with other doctoral programs at Dalhousie University, JSD candidates must pay fees at the full-time rate for two years regardless of whether they have been required to spend a second year in residence at Dalhousie.

3. Class Requirements

In addition to the period in residence, candidates must complete the following:

i) fully supervised research work leading to a substantial and significant dissertation
ii) one directed reading class
iii) one area exam
iv) thesis proposal defence
v) class work and other examinations as required by the Graduate Studies Committee

4. Special Skill Examination Requirements

A candidate may, at the discretion of the thesis committee, be required to pass a special examination designed to demonstrate the examinee's proficiency in a foreign language, statistical method, computer analysis, or other skill deemed to be important for successful completion of the candidate's thesis in the chosen area.

5. Thesis Requirements

The primary requirement for the JSD degree is the completion of a substantial thesis which should not only display original scholarship of high standard, but also represent a significant and professional contribution to the literature of the chosen subject. In applying for admission, an applicant is required to satisfy the Graduate Studies Committee of the Faculty of Law that the suggested topic is suitable for development as a doctoral thesis. Normally, a JSD thesis should be between 350 and 500 typescript pages in length (double-spaced). After an applicant has been accepted, a thesis committee consisting of a supervisor and two advisors will be appointed by the Graduate Studies Committee of the Faculty of Law. All candidates are required to comply with the decisions of their thesis committees. In normal circumstances, the completed JSD thesis must be submitted to the Graduate Studies Committee of the Faculty of Law within five years of the date of original registration in the program. Submission of the thesis must follow the rules and regulations laid down by the Faculty of Graduate Studies.

6. Thesis Defence Requirements

Each JSD candidate is required to defend the completed thesis in an oral examination. This defence shall be conducted in accordance with the Faculty of Graduate Studies Regulations for Oral Examination of a Doctoral Candidate.

7. Teaching Activities

The Graduate Studies Committee of the Faculty of Law may give permission to a JSD candidate to engage in teaching activities during the period of residency, if such activities are deemed to fall within the field of the candidate's thesis topic. Under no circumstances shall any JSD candidate be permitted to spend more than six hours per week in teaching activities and related preparations.

C. Classes

For a description of classes offered in Law, see the Dentistry, Law, Medicine calendar.

For more information, please contact our website: www.dal.ca/law

Marine Affairs Program

Location: 6100 University Avenue, Suite 2127
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Telephone: (902) 494-3555
Fax: (902) 494-1001
Email: Marine.Affairs@Dal.ca
Website: http://www.marineaffairsprogram.dal.ca

Director

Fanning, L., BSc, MMM, PhD (Dal)

Faculty

Apostle, R., BA, MA, PhD (Calif, Berkeley) (Sociology and Social Anthropology and Marine Affairs Program)
Binkley, M., BA, MA, PhD (Toronto) (Sociology and Social Anthropology)
Brooks, M., BOT, MBA, PhD (Wales) (Business Administration)
Cavanagh, E., BSc, BArch, PhD (Lehigh) (Architecture)
Chircop, A., LLD, LLM, JSD (Dal) (Law and Marine Affairs Program)
Côté, R., BSc, MSc (MUN) (School for Resource and Environmental Studies)
Kindred, H., LLB (Bristol), LLM (London), LLM (Illionois) (Law)
Lane, P.A., MSc, PhD (SUNY Albany) (Biology)
McConnell, M.L., BA, LLB, PhD (Sydney) (Law)
Pelot, R.P., BSc, MSc, PhD (Waterloo) (Engineering and Business Administration)
Taggart, C., BSc, MSc, PhD (McGill), (Oceanography and Marine Affairs Progamme)
VanderZwaag, D., BA, MDiv, JD, LLM (Dal) PhD (Univ. of Wales) (Law)
Willison, J.H.M., PhD (Nottingham) (Biology and School for Resource & Environmental Studies)

Adjunct Professors

Charles, A., BScH, PhD (UBC) (Finance and Management Science, St. Mary's University)
Dwire, A., BA, MA (Dal) (Sociology and Social Anthropology)
Fournier, R., MSc, PhD (URI)
Hildebrand, L., BScH, MES (Dal) (Environment Canada)
Hodgson, J. R., BSc, MSc (London), FCILT
McAllister, R.I., MA, MA (Cantab)
McCalla, R., BA, PhD (Hull), (Geography, St. Mary's University)
Newkirk, G. F., PhD (Duke) (Biology, Lester Pearson International, and Marine Affairs Program)
Wells, P.G., BSc, MSc, PhD (Guelph) (Environment Canada)
Williamson, H., BSc, BEd, LLB, MBA (Dal), (Marine Affairs Program)

Adjunct Research Associates

Bailet, F., BSc, DEA, PhD (U. Nice Sophia-Antipolis), Division for Ocean Affairs and the Law of the Sea, United Nations
Butler, M., BSc, MSc (Memorial), International Ocean Institute
Carrera, G., B. Geophys. Eng., MSC Eng, PhD (Toronto)
Gustavson, K., BSc, MSc, PhD (University of Victoria), Jacques Whitford Environment Ltd.
Rudd, M., BSc., MSc., PhD (Wageningen), Memorial University of Newfoundland

I. Introduction

The main focus of the Marine Affairs Program is the Master of Marine Management (MMM), a professional degree program that links many stakeholders in the marine and oceans community. Students pursue the MMM in one or more of five related areas (streams): (1) integrated coastal and ocean management; (2) marine environmental management; (3) marine law and policy (4) fishery policy and management; and (5) maritime transport management.

II. Master of Marine Management

The Master of Marine Management (MMM) provides a theoretical and practical basis for understanding coastal and ocean development, planning, and regulatory issues affecting the maritime industries and the sustainable use of the seas' resources. The MMM degree is a professional, interdisciplinary, non-thesis program requiring core classes in the marine, social and management sciences as well as a choice of electives from areas such as marine science, policy and law.

Subject areas addressed in the program include but are not limited to coastal tourism, coastal zone management, community based co-management, ecosystem based management, conflict management, development and conservation of living and non-living resources, managing for climate change, fisheries management, marine law and policy, integrated coastal and ocean planning, marine protected areas, maritime enforcement, maritime transport, and protection and preservation of the coastal and marine environment. Students are required to complete a graduate project with an emphasis on management, and to undertake a training internship at an organization relevant to their expertise and interests. The overarching emphasis of the program is on the solution of marine management problems by trans-disciplinary synthesis. Teamwork in research and planning is the primary *modus operandi* of the Marine Affairs Program. The MMM degree's format attracts a high proportion of mid-career professionals from all over the world.

Admission Requirements/Deadlines

Applicants must satisfy general requirements for admission to the Faculty of Graduate Studies. These include a Bachelor's Degree from a university of recognised standing with honours or its equivalent with a minimum average of B (3.0 GPA, 73% or Second Class Honours, Upper Division). In some cases, additional university education may be required. Selection criteria include an essay demonstrating interdisciplinary, relevant work experience, and career objectives. Applicants from outside Canada whose first language is not English must demonstrate proficiency in English before admission or have completed a university degree in English. The standard test is TOEFL (Test of English as a Foreign Language). It is also recommended that potential students take the Test of Written English component of the TOEFL. Dalhousie sets a minimum acceptable TOEFL score of 580 for the paper-based test, 237 for the computer-based test and 92 for the internet-based test. Other tests that are accepted by Dalhousie are MELAB (minimum score of 90), IELTS (minimum score of 7) and CAEL (minimum score 60 overall, no band score lower then 50). Scholarships are available on a competitive basis.

The MMM degree may be completed on a part-time basis. Applicants must meet the same requirements for admission as full time MMM students. Applications for completing the MMM degree on a part-time basis must be submitted to the Marine Affairs Program by February 28.

A limited number of part-time MMM students can be enrolled in an academic year. Part-time MMM students will complete the MMM degree over a period no greater than five contiguous calendar years (i.e. 60 months). The MMM degree is a Program fee degree and part-time MMM students must meet the tuition fee requirements of the Registrar's Office.

The part-time MMM student must take MARA 5001.06 Contemporary Issues in Ocean Management and Development and MGMT 5000.03 Management Without Borders in the first year of their MMM degree program.

Part-time MMM students will meet with the Academic Coordinator of MAP to prepare course plan.

Deadline for applications is January 31 for applicants requesting financial assistance and February 28 for all other applicants.

Scholarships

All applicants are urged to apply for scholarship funding from their home countries, donor organizations and foundations. Applicants should be mindful of the timing of potential scholarships in the event that they need assistance from MAP.

III. Class Descriptions

All classes are open to graduate students in other programs by permission of the instructor.

NOTE: Not all classes are offered every year. Please consult the current timetable to determine this year's class offerings.

A. Required Classes

MARA 5001X/Y.06: Contemporary Issues in Ocean Management and Development.

This class offers an introduction to the field of marine affairs, and in particular to integrated coastal and ocean management. Subject areas addressed include principles of integrated planning, coastal area management, sea use planning, fisheries management, marine law and policy, maritime transport, development of non-living resources, protection and preservation of the coastal and marine environment, coastal tourism, maritime enforcement and conflict management. The class employs interactive teaching techniques with considerable group work. Instructors for the various subjects come from Halifax universities, federal and provincial government agencies and the private sector.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): L. Fanning, R. Apostle

MARA 5002.06: Graduate Project.

Students are required to apply the knowledge gained through class work to a specific planning and management problem or issue of interest to them. The project contains both a written and a practical component. The written portion is completed under the supervision of an appropriate academic advisor. Students are required to give a presentation on their graduate project. The practical component provides students an internship period with a local public or private sector agency of relevance to the project topic. The area of research must be approved by the MAP Director and Graduate Project Committee
COORDINATOR: L. Fanning

MARA 5003.03: Marine Science and Technology.

This class provides a survey of marine science and technology (basic marine-basin geography and geology, physical, chemical and biological oceanography). Various fields and topics are addressed from a scientific research and technology application perspective. Where possible, and relevant, the application of the scientific findings to issues of management, resource exploitation and policy formation are addressed. Course content and assignments should help marine managers use science and technology to: 1) recognize /formulate problems; 2) identify relevant information necessary to address problems; 3) find relevant and reliable information/assistance; 4) reliably interpret the information to make objective management decisions.
INSTRUCTOR(S): R. Fournier, C. Taggart

MGMT 5000.03: Management Without Borders: A Foundation Course for Masters Students in Management.

This course places management in its broadest context and helps students from diverse disciplines understand the complex social, economic, ecological, political and technological forces shaping 21st century leadership in the public, private and non profit sectors. Key themes explored in the course include systems thinking, values based approaches to management, and personal and professional development. The course is team taught by leading faculty from across the Faculty of Management and is supported by BLS. Learning opportunities are delivered in a mix of formats, including lectures, readings, videos, multi-disciplinary cases and group discussions. The course is characterized by a strong emphasis on inter-disciplinary team working for effective problem solving in complex environments.
INSTRUCTOR(S): D. Wheeler

B. Electives

Students select the remaining complement of classes from the broad range offered in the marine field at Dalhousie. Elective courses offered through the Marine Affairs Program are listed below.

MARA 5005.03: Independent Readings.

This class is an option for MMM students who wish to pursue independent research into a specific topic not covered in another class. The topic and area of research must be approved by the MAP Director and the research supervisor.

MARA 5008.03: Integrated Maritime Enforcement.

The aim of this class is to sensitize students to the complexities of maritime enforcement within a coastal and ocean management framework by building an understanding of the roles of maritime enforcement in integrated planning and management. In doing so, students are introduced to concepts, tools, techniques and procedures of enforcement.
INSTRUCTOR(S): H. Williamson

MARA 5009.03: Coastal Zone Management.

This seminar is designed to introduce students to the concepts, principles, approaches, and issues associated with integrated management of coastal zones worldwide. This class uses a systems approach to understanding the global context of coastal zone management. Case studies and examples from developed and developing countries are used to present practical approaches to the management of multiple uses in the coastal zone, including community-based management models.
INSTRUCTOR(S): L. Fanning
CROSS-LISTING: ENVI 5204.03, LAWS 2041.03

MARA 5012.03: Community-Based Co-Management.

This class will critically examine the extent to which community-based co-management provides a viable approach to marine resource management in terms of its costs and benefits, opportunities for and barriers to its implementation, and conditions necessary for its long-term survival as a practical management tool.
INSTRUCTOR(S): A. Dwire
CROSS-LISTING: SOSA 5540.03

MARA 5013.03: Marine Protected Areas.

The creation of refugia from human exploitation in the marine environment for the purposes of conservation and sustainable resource usage is a fast-growing application of ecological theory and ecosystem-based management. The holistic approach marries ecological research, fisheries science, park management and social policy. Criteria and information requirements for the selection, establishment and adaptive management of Marine Protected Areas are evolving on many fronts. Professionals in marine affairs need to be aware of the state of the art in Marine Protected Areas theory and practice. That is the goal of this class.
INSTRUCTOR(S): Staff
CROSS-LISTING: BIOL 5013.03

MARA 5014.03: Integrated Coastal and Ocean Planning.

This class introduces spatial planning of coasts and oceans. It integrates environmental design, planning, policy, and management. It emphasizes tools and processes for professional field work, analysis, and synthesis. Students gain practical experience of theory, practice, and professional aspects of coastal planning by drafting plans or proposals for action.
INSTRUCTOR(S): Staff
CROSS-LISTING: ARCH 6119.03

MARA 5015.03: Marine Transportation Policy and Administration.

This class will provide a comprehensive overview of marine transportation and related activities. Special emphasis is placed on the role of government, including the formulation of marine transportation policy, supporting legislation/regulation, the development and delivery of regulatory programs, the provision of public marine support services, and associated governance considerations.
INSTRUCTOR(S): J. Calvebert

MARA 5021.03: Fisheries Management.

This interdisciplinary course focuses on the theory and practice of fishery management, with emphasis on Sustainable Fishery Systems. It will address the structure and dynamics of fisheries, and key themes in managing fisheries for sustainability and resilience, through class seminars and discussion, as well as attendance at related fisheries and coastal events.
INSTRUCTOR(S): T. Charles
CROSS-LISTING: ENVI 5021.03

Mathematics and Statistics

Location: Chase Building
Halifax, NS B3H 3J5
Telephone: (902) 494-2572
Fax: (902) 494-5130
Email: mscs@mathstat.dal.ca
Website: http://www.mathstat.dal.ca

Chairperson of the Department

Dilcher, K., PhD (Queens)

Professors Emeriti

Field, C.A., MSc, PhD (Northwestern)
Fillmore, P.A., MSc, PhD (Minn), FRSC
Grunenfelder, L., PhD (ETH Zurich)
Radjavi, H., MA, PhD (Minn)
Swaminathan, S., MA, MSc, PhD (Madras)
Thompson, A.C., PhD (Newcastle upon Tyne)

Professors

Borwein, J., BA (Western), MSc, PhD (Oxford), FRSC, (joint appointment with Computer Science)
Brown, J., MSc, PhD (Toronto)
Coley, A.A., PhD (London), Killam Professor
Dilcher, K., PhD (Queen's)
Gabor, G., MSc, PhD (Eotvos)
Hamilton, D., MA, PhD (Queen's)
Nowakowski, R.J., MSc, PhD (Calgary)
Paré, R., MSc, PhD (McGill)
Smith, B., MA (Calgary), PhD (Berk)
Tan, K.K., PhD (UBC)
Taylor, K., BSc (St. FX), PhD (U. Alberta)
Thompson, K., PhD (Liverpool) (NSERC University Research Fellow) (jointly with Oceanography)
Wood, R.J., MSc (McMaster), PhD (Dalhousie)

Associate Professors

Fraser, A.J., MSc (Toronto), PhD (Princeton)
Gu, H., MSc (Peking), PhD (Hong Kong)
Herbinger, C., MSc (Paris), PhD (Dalhousie) (joint appointment with Biology)
Janssen, J.C., MSc (Eindhoven), PhD (Lehigh)
Johnson, K.P., MSc (Toronto), PhD (Brandeis)
Milson, R., MSc, PhD (McGill)
Mitnitski, A., PhD (Leningrad) (joint appointment with Medicine)
Pronk, D., MSc, PhD (Utrecht)
Selinger, P., PhD (U. Pennsylvania)
Susko, E., PhD (Waterloo)
Zhao, Y., MSC (Western Kentucky), PhD (British Columbia) (joint appointment with Management)

Assistant Professors

Beiko, R., PhD (Ottawa) (joint appointment with Computer Science)
Bielawski, J., MA, PhD (Texas A & M Univ) (joint appointment with Biology)
Bowen, K., PhD (California)
Dowd, M., MBA, MES, PhD (Dalhousie)
Faridi, S., MA (Brandeis), PhD (Michigan)
Flemming (Mills), J., MSc (Tuns), PhD (Dalhousie)
Iron, D., MSc, PhD (UBC)
Kolokolnikov, T., MSc, PhD (UBC)
Smirnov, R., BSc (Kyiv), PhD (Queens)

Lecturers

Barger, J., BSc (Pace N.Y.), BEd, MA (Dal)
Cameron, E., MA (Oxon)
Surovell, A., MA (U.Mass), AB (Boston)

Postdoctoral Fellows

Brannlund, Johan (Stockholm)
Chan, O.-Yeat (Illinois)
Hervik, S. (Cambridge)
Jonsen, Ian (Alberta)
Kenny, Toby (Cambridge)
Manna, Dante (Tulane)
Pelavas, N. (Queen's)
Pralat, Pawel (Adam Mickiewicz)
Wang, H. (Ottawa)

Adjunct Professors

Astatke, T., PhD (Queen's), NS Agricultural College
Beattie, M.A., PhD (Queen's), Mt. Allison University
Bonato, A., PhD (Waterloo, Wilfred Laurier University
Brunner, H., PhD (Zurich), Memorial University
Chipman, H., PhD (Waterloo), Acadia University
Clarke, N., PhD (Dalhousie), Acadia University
Clements, J.C., MA (UBC), PhD (Toronto), Dalhousie University
Cole, D.E.C., PhD (McGill), University of Toronto
Curry, E., PhD (Rutgers), Acadia
Dawson, R., PhD (Dalhousie), St. Mary's University
Fitzpatrick, S., PhD (Dalhousie), UPEI
Fry, R., PhD (Toronto), Thompson Rivers University
Grant McLoughlin, J., PhD (SUNY at Buffalo), UNB
Grünenfelder, L., PhD (ETH Zurich), Dalhousie University
Gupta, R.P., MSc (Agra), PhD (Delhi), Dalhousie University
Hartnell, B., PhD (Waterloo), St. Mary's University
Haynes, R., PhD (Simon Fraser), Acadia University
Hines, P.C., PhD (Bath), DREA
Hutt, D., PhD (Laval), DREA
Keast, P., PhD (St. Andrews), Dalhousie University
McLenaghan, R., PhD (Cambridge), Waterloo
Millar, M., MSc, PhD (Dalhousie), Mt. St. Vincent
Muir, P., PhD (Toronto), St. Mary's University
Piccinini, R., PhD (Wisconsin), Univ. of Milan and Dalhousie Univ.
Rosebrugh, R., PhD (Dalhousie), Mt. Allison University
Ryan, D., PhD (Guelph), UPEI
Sastri, C.C.A., MSc (Andhra), PhD (NY), Dalhousie University
Sutherland, W.R.S., PhD (Brown), Dalhousie University
Traves, W., MSc, PhD (Toronto), US Naval Academy
Van den Hoogen, R., PhD (Dalhousie), St. Francis Xavier University
Wolfe, D., PhD (Berkeley), Gustavus Adolphus

Research Associate

Piccinini, R. (Milan)

Information concerning programs and classes in Mathematics follows immediately. For information on programs and classes in Statistics and Computer Science (including Computing Science) please refer to these sections of this calendar.

Mathematics

Location: Chase Building
Halifax, NS B3H 4R2
Telephone: (902) 494-2572
Fax: (902) 494-5130
Website: http://www.mathstat.dal.ca

Chair of Department

Dilcher, K.

Director of Division

Janssen, J.

Graduate Coordinator

Nowakowski, R.

The department offers programs leading to the degrees of MSc and PhD in the following areas: algebra, category theory, differential equations, functional analysis, graph theory, number theory, numerical analysis, perturbation theory, invariant theory commutative algebra, foundations of computation, general relativity theory, stochastic modelling, topology.

I. Admission Requirements

Candidates must satisfy the general requirements for admission to the Faculty of Graduate Studies. Candidates will normally be expected to hold a degree recognised by Dalhousie University as the equivalent of a Bachelor's degree with Honours in one of its own faculties.

GRE Aptitude and Advanced Mathematics scores are recommended for all applicants for graduate studies whose undergraduate work has been completed outside of Canada, and TOEFL scores are required for applicants whose native language is not English. Valid score reports must be received directly from the Educational Testing Service. To ensure consideration for scholarship funds, application should be made by January 31.

II. Degree Programs

A. Masters

Requirements

1. At least three full-credit classes, not including seminar classes, at the graduate level to be chosen in consultation with a department adviser. In addition, students whose preparation in a particular area of mathematics is deficient will be required to complete appropriate classes which will be designated by the adviser.
2. Attendance and participation in seminars.
3. A satisfactory thesis.
4. Students are required to give an oral presentation of their thesis and at that time to answer questions about the thesis. This presentation will be made after the thesis is in the hands of the student's committee and will be taken into account when the committee makes its decision.

B. Doctor of Philosophy (PhD)

Requirements

NOTE: The minimum and maximum time required to complete this program are set out in section 5 of the Faculty Regulations.

1. At least one full-credit class during each of the first two years of the program.
2. Comprehensive examinations which must be taken for the first time within 12 months and successfully completed within 16 months of registration in the program.
3. Attendance and participation in an appropriate seminar.

4. Preparation and defence of a satisfactory research thesis.

NOTE: Students interested in pursing a degree program in Applied and Computational Mathematics designed to prepare them for the work environment should consider the following classes:

MATH 5190.03
MATH 5200.03
MATH 5220.03
MATH 5230.03
MATH 5270.03
MATH 5290.03
MATH 5300.03
MATH 5310.03
MATH 5400.03
One of STAT 5080.03, STAT 5370.03, or STAT 5620.03

III. Class Descriptions

A selection of the following graduate classes will be offered subject to demand:

MATH 5010.03/4010.03: Introduction to Measure Theory and Integration.

A discussion of Lebesgue's theory of measure and integration on the real line. The topics include: the extended real number system and its basic properties; the definition of measurable sets, Lebesgue measure and the existence of non-measurable sets; the Lebesgue integral; differentiation of monotonic functions (e.g. The Cantor function), absolute continuity, the classical Lebesque spaces, Fourier series.
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 3500.06
CROSS-LISTING: MATH 4010.03

MATH 5025.03/4025.03: Commutative Algebra I.

This introduction to commutative algebra includes a selection of the following topics: prime and maximal ideals, primary decomposition, Noetherian rings, Hilbert's Basis Theorem and the Nullstellensatz.
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 3030.06 or equivalent
CROSS-LISTING: MATH 4025.03

MATH 5040.03: Homological Algebra.

MATH 5045.03/4045.03: Advanced Algebra I.

Topics may include: structure of groups, rings, fields, and modules; Galois theory. Other topics of special interest may be covered.
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 3030.06
CROSS-LISTING: MATH 4045.03

MATH 5051.03: Integral Geometry of Convex Bodies and Polyhedra.

Convex bodies, Hausdorff metric, polytopes, volume, area, mixed volumes, isoperimetric problem, the Minkowski problem, Euler characteristic, valuations, Buffon needle problem, Crofton formulas, Hilbert's third problem, Hadwiger's theorem.
PREREQUISITE: Undergraduate level real analysis and linear algebra

MATH 5052.03: Convexity and Fixed Point Algorithms in Hilbert Space.

An account of convex analysis and Optimization in Hilbert Space. Fixed point theory. The interplay among convexity, monotonicity and non-expansiveness will be emphasized.

MATH 5055.03/4055.03: Advanced Algebra II.

Topics may include: Algebras over a field, classical representation theory of groups and algebras, lattices, Boolean algebra. Additional topics may be covered at the discretion of the instructor.
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 3030.06
CROSS-LISTING: MATH 4055.03

MATH 5056.03: Massive Networks and Internet Mathematics.

Introduction to massive real-world graphs and random graphs. Models of massive networks, degree distributions. Searching networks. HITS and Pagerank.
FORMAT: Lecture
PREREQUISITE: MATH 2112/2113, MATH 2030/2040, MATH 3360

MATH 5065.03/4065.03: Algebraic Geometry.

This is a first course in algebraic geometry and will introduce students to the basic properties of affine and projective varieties. Topics covered will include a selection from: local properties of plane curves, elliptic curves, Bezout's Theorem, Riemann-Roch Theorem.
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 3030.06
CROSS-LISTING: MATH 4065.03

MATH 5066.03: Advanced Statistical Theory I.

CROSS-LISTING: MATH 4066.03, STAT 4066.03/5066.03.

MATH 5067.03: Advanced Statistical Theory II.

CROSS-LISTING: STAT 5067.03

MATH 5070.03/4070.03: Topics in Number Theory.

The class is intended to give an introduction to both analytic and algebraic number theory.
Following a short review of basic notions from elementary number theory, there will be a detailed discussion of quadratic reciprocity and some of its applications and extensions. The main topics from analytic number theory will be arithmetric functions a Dirichlet L-series, resulting in a proof of Dirichlet's theorem on primes in arithmetic progressions. Finally, some fundamental properties of algebraic number fields will be discussed, with some emphasis on quadratic and cyclotomic fields.
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 3070.03
CROSS-LISTING: MATH 4070.03

MATH 5071.03: Topics in Number Theory II.

A continuation of Math 5070 covering a selection of the topics from that course at a more advanced level suitable for PhD students in this area.
FORMAT: Lecture or Seminar
PREREQUISITE: MATH 5070.03 or consent of the instructors

MATH 5090.03/4090.03: Probability.

A mathematically rigorous treatment of probability theory in Euclidean space. Topics include the definitions and properties of random variables and their distribution functions, various convergence concepts, the Borel-Cantelli lemma, weak and strong laws of large numbers, characteristic functions, central limit theorems. Although the necessary measure theory is introduced, a previous analysis class is an asset.
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 3360.03 and a third year analysis class
CROSS-LISTING: MATH 4090.03, STAT 4090.03/5090.03

MATH 5116.03: Cryptography.

This class is an introduction to modern cryptographic techniques and its mathematical foundations. The material covered includes: elementary number theory and algebra; classical cryptosystems; probability; the Data Encryption Standard; prime number generation and primality tests; public key cryptosystems; further applications, such as digital signatures and identification. The class ends with a brief overview of other cryptosystems, such as elliptic curve cryptography.
PREREQUISITE: MATH 1000.03, 1010.03, 2030.03, and at least one full-year mathematics course beyond the first year
CROSS-LISTING: CSCI 4116.03

MATH 5135.03/4135.03: Introduction to Category Theory.

Categories, functors, natural transformations and adjointness are introduced with emphasis on examples drawn from undergraduate Mathematics and theoretical Computer Science. The calculus of diagram

chasing, limits, colimits and Kan Extensions is explored in detail to provide a thorough foundation for subsequent specialized classes.
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 3030.06 or permission of the instructor
CROSS-LISTING: MATH 4135.03

MATH 5136.03: Topics in Category Theory.

Topics of current interest in category theory will be discussed with an emphasis on open problems. No previous knowledge of category theory is required. The necessary concepts will be discussed in the context of their applications. However, a certain familiarity with the basic concepts of modern abstract mathematics such as found in courses on algebra and topology would be an asset.
PREREQUISITE: Math 3030.03 and consent of instructor
CROSS-LISTING: MATH 4136.03

MATH 5140.03/4140.03: Introduction to Functional Analysis.

An introduction to the basic principles of functional analysis including the following topics: infinite dimensional vector spaces, normed spaces, inner-product spaces, Banach and Hilbert spaces, linear and continuous linear functionals, the Hahn-Banach Theorem, the principle of uniform boundedness, dual spaces, weak* topology, and the Alaoglu theorem, the open mapping and closed graph theorems, and consequences and applications.
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 2135.03 and 3500X/Y.06
CROSS-LISTING: MATH 4140.03

MATH 5160.03/4160.03: Operator Theory.

An introduction to the theory and applications of continuous linear operators on Hilbert spaces, culminating with the spectral theorem, and including such topics as spectrum; adjoint; symmetric, self-adjoint, unitary, and normal operators; polar decomposition; differential and integral operators; C* algebras; Gelfand's Theorem; and the spectral theorem.
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 4010.03 and 4140.03
CROSS-LISTING: MATH 4160.03

MATH 5166.03: Elliptic Curve Cryptography.

This class will cover a selection of topics beyond those covered in Math 4116/5116. For example, elliptic curve cryptography covering the group law, torsion points, group structure, Hasse-Well bound, Weil pairing, affine and projective spaces and supersingular curves.
FORMAT: Lecture
PREREQUISITE: MATH 3030X/Y

MATH 5170.03/4170.03: General Topology.

An introduction to topological spaces, and includes the following topics: classification in terms of cardinality of bases, separation, etc., product spaces, Tychonoff theorem, compactness, compactifications, Tychonoff spaces, metrization.
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 3500X/Y.06
CROSS-LISTING: MATH 4170.03

MATH 5180.03/4180.03: Introduction to Algebraic Topology.

An introduction to algebraic topology which will cover the following topics: the definition, properties and methods of computation of the fundamental group of a topological space; simplicial, singular and cellular homology groups; basic properties and methods of computation of homology groups; a selection of applications such as the classification of surfaces and fixed point theorems.
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 2505.03
CROSS-LISTING: MATH 4180.03
CO-REQUISITE: MATH 3030.03

MATH 5190.03/4190.03: Ordinary Differential Equations.

The purpose of this class is to introduce the student to various analytic, algebraic, and geometric aspects of the theory of ordinary differential equations. Topics include: existence and uniqueness
theory, flows and dynamical systems, symmetry and self-similarity, exact solutions, applications to mathematical physics and biology.
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 3500.06 (3090.03 and 3100.03) and 2030.03/ 2040.03 or 2135.03
CROSS-LISTING: MATH 4190.03

MATH 5195.03: Topics in Topology and Functional Analysis.

Topology is the mathematical subject that allows one to make precise the concept of continuity. Rudin defines functional analysis as the study of certain topological-algebraic structures and of the methods by which knowledge of these structures can be applied to analytic problems. He adds that the subject is huge and growing rapidly and, accordingly, we offer a "topics" class.
RECOMMENDED: MATH 3030X/Y.06
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 3500X/Y.06
CROSS-LISTING: MATH 4195.03

MATH 5200.03/4200.03: Ordinary Differential Equations - Qualitative Theory.

Qualitative theory is concerned with what can be determined about the phase-portrait and the general behavior of solutions of differential equations even though those solutions are not explicitly exhibited. Topics are selected from Liapunov stability theory, stable and unstable manifolds of singular points and periodic solutions, classification of plane singular points, structural stability, differential equations on manifolds and Hamiltonian systems. Various equations occurring in applications are qualitatively analyzed. The precise topics and equations covered depend on the specific interests of the instructor and the students.
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 4190.03
CROSS-LISTING: MATH 4200.03

MATH 5220.03/4220.03: Introduction to Partial Differential Equations.

This class is the first half of a two term sequence designed to introduce the student to the theoretical and numerical aspects of partial differential equations. Topics to be covered include: review of the theory of ordinary differential equations, classification of partial differential equations, solution of first order equations, the diffusion equation and random walk, Fourier Series and transforms, generalized functions, eigenfunction expansions.
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 3110.03
CROSS-LISTING: MATH 4220.03

MATH 5230.03/4230.03: Partial Differential Equations.

This class continues the theoretical study of partial differential equations and also introduces numerical methods of solution. Topics to be covered will be chosen from: the Rayleigh-Ritz method, Green's functions, finite difference and finite element methods, collocation, the method of lines, two-point boundary value differential equations.
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 4220.03
CROSS-LISTING: MATH 4230.03

MATH 5250.03: Asymptotic Analysis.

Most mathematical models of physical systems cannot be solved exactly. Often such systems have a naturally occurring small parameter which may be exploited using asymptotic analysis techniques. In this course, we will study a variety of physical systems which illustrate many of the common approaches used in asymptotic analysis. Focus will be on applications to ordinary and partial differential equations.
FORMAT: Lecture

PREREQUISITE: MATH 2001, MATH 2002, MATH 2030
CROSS-LISTING: MATH 4250.03

MATH 5270.03/4270.03: Numerical Software.

The design and implementation of reliable programs and libraries for numerical computation are the focus of this class. Available program libraries such as NAG and software packages available on netlib are reviewed. Particular attention is paid to the choice of subroutine parameters and the tradeoffs between convenience, simplicity and generality.
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 3170.03 (with a grade of C- or better)
CROSS-LISTING: MATH 4270.03

MATH 5285.03/4285: The Numerical Solution of Ordinary Differential Equations.

This is a comprehensive class in the numerical solution of ordinary differential equations and differential-algebraic equations (DAEs). Topics include a brief introduction to differential equations; basic concepts in numerical analysis; the numerical solution of initial-value problems by linear multistep and Runge-Kutta methods; the concept of stiffness; the numerical solution of boundary-value problems by simple shooting, multiple shooting, finite differences, and collocation; an introduction to DAEs; algorithms and software for the numerical solution of DAEs. The use of state-of-the-art algorithms and software will be emphasized.
PREREQUISITE: MATH 1010.03, MATH 2030.03, MATH 3110.03, and one of CSCI 1100.03,CSCI 1202.03, or MATH 1400.03.

MATH 5290.03/4290.03: Mathematical Analysis of Dynamic Biological Systems.

This class is concerned with the construction, analysis and interpretation of mathematical models of dynamical biological and medical systems. Topics covered will include neural networks, electro-biology, epidemiology and the transmission of HIV, the morphology of complex biological and chemical systems and pattern formation in morphogenesis.
FORMAT: Lectures 3 per week; seminars 1 per week
PREREQUISITE: MATH 3110.03 and MATH 3120.03 or their equivalent
CROSS-LISTING: MATH 4290.03, BMNG 5220.03

MATH 5300.03/4300.03: Optimal Control Theory.

Initially the classical calculus of variations is studied and the sufficiency conditions emphasized. A constructive solution of the Euler equations is presented. Then the modern theory of optimal control is developed using techniques of mathematical programming. This approach is applied to a variety of problems such as economic growth theory, inventory control and regulator problems. Numerical methods are also presented.
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 3110.03 and MATH 3090.03
CROSS-LISTING: MATH 4300.03

MATH 5310.03/4310.03: Nonlinear Programming.

A thorough introduction to the mathematical problem of optimizing a real-valued function of n variables subject to a system of constraints. Theoretical topics include the theory of convex sets and functions, directional derivatives, the Karush-Kuhn-Tucker optimality conditions, and dual problems. Several algorithms will be developed for the numerical solution of problems, including quasi-Newton and barrier methods. Software packages will be used to solve practical applications. (or 2040.03).
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 3500X/Y.06 (or 3090.03 and 3100.03) and 2135.03
CROSS-LISTING: MATH 4310.03

MATH 5320.03: Combinatorial Optimization.

Various graph algorithms will be presented and analysed. Specifically we will treat the algorithms for the problems Minimum Spanning Tree, Shortest Path, maximal Flow, Minimum Cost Flow, Maximum Matching. For each problem, various algorithms will be presented and compared. Correctness will be proved, and complexity bounds given.
The link with Linear Programming, especially LP-Duality, will receive special attention. The theory of Linear Programming will be reviewed for this purpose. Algorithm complexity will be treated in context. The complexity classes P and NP will be loosely introduced and discussed through the comparison of examples such as matching vs. travelling salesman.
PREREQUISITE: Linear algebra should be a prerequisite, while some knowledge of linear programming and the theory of algorithms is recommended.
CROSS-LISTING: MATH 4320.03

MATH 5330.03/4330.03: Topics in Graph Theory.

This class is intended for math and computer science students. Items to be selected from the following topics: graphs and matrices, graphs and groups, network analysis, extremal graph theory, enumeration problems, algebraic methods in graph theory.
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 3330.03 or CSCI 3115.03 or permission of the Instructor
CROSS-LISTING: MATH 4330.03, CSCI 4115.03

MATH 5340.03: Discrete Random Structures.

The combination of probability theory and combinatorics has given rise to both a rich new theory, as well as a wealth of applications. The so-called probabilistic method, namely, the application of probabilistic techniques to combinatorial problems, has given a new perspective on classical combinatorics. Probability is now also used successfully in the design of discrete algorithms. A combination of probability and combinatorics is often needed when modeling discrete processes and networks that occur in nature. This course will explore the use of probability on discrete structures. It will contain an introduction to probability and stochastic processes, and then focus on one or two research areas where probability and combinatorics interact.
FORMAT: Lecture
PREREQUISITE: MATH 4330/5330 or MATH/CSCI 2113, or permission from the instructor
CROSS-LISTING: MATH 4340

MATH 5360.03: Combinatorial Modelling.

This course introduces a broad common framework for combinatorial structure, with an emphasis on how to model these structures with other fields of mathematics. The modeling process shows how fundamental concepts in various branches of mathematics can be used to prove results in combinatorics that are not easily provable otherwise.
FORMAT: Lecture
PREREQUISITE: MATH 2060.03,MATH 3030X/Y.06
CROSS-LISTING: MATH 4360.03

MATH 5400.03/4400.03: Applied Mathematics in Science and Industry.

This class is concerned with the construction, analysis and interpretation of mathematical models in the natural sciences with an emphasis on industrial applications. Specific applications of potential theory, diffusion phenomena and wave propagation will be examined in detail. A brief introduction to the calculus of variations approach to the optimal control of dynamical systems will be given and some recent applications discussed.
RECOMMENDED: MATH 3120.03
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 3110.03
CROSS-LISTING: MATH 4400.03

MATH 5410.03/4410.03: Topics in Cosmology.

A self-contained introduction to cosmology will be given and no prior knowledge of differential geometry or general relativity will be assumed (although some knowledge of elementary differential equations will be useful). A cosmological model is a model of the universe, as a whole, on the largest scales; the emphasis of the class will be on the modeling aspects of cosmology.
FORMAT: Lecture 3 hours
PREREQUISITE: Instructor's permission
CROSS-LISTING: MATH 4410.03, PHYC 4660.03/5660.03

MATH 5530.03/4530.03: Differential Geometry.

This class is an introduction to differential and Riemannian geometry. It serves advanced undergraduates and graduate students with interests in geometry and mathematical physics, and in particular general relativity. There are 4 major topic areas.
1. Elements of Surface Theory. First and second fundamental form; curvature; theorema egregium; intrinsic versus extrinsic geometry; parallel transport; geodesics.
2. Tensors. Vector spaces and duals; invariance; covariance; contravariance; exterior and tensor algebra.
3. Differential Manifolds. Review of point-set topology; charts and atlases. Vectors and the tangent bundle; vector fields and 1-parameter flows. Tensor fields. Intrinsic differential operations: pull-backs, the vector brackets, the exterior derivative. Differential forms and integration.
4. Riemannian geometry. The metric tensor; length of curves and volume. The Levi-Civita connection; parallel transport and geodesics; curvature; covariant differentiation; the Laplacian and the gradient operators.

FORMAT: Lecture 3 hours
PREREQUISITE: MATH 3065.03
CROSS-LISTING: MATH 4530.03

MATH 5535.03: Topics in Differential Geometry.

The material is a natural continuation of Math 4/5530 offering a set of advanced topics in differential geometry based on the approach developed by Elie Cartan.
FORMAT: Lecture
PREREQUISITE: consent of the instructor

MATH 5650.03/4650.03: Relativity and Cosmology.

A review of differential geometry will be given followed by an introduction to the general theory of relativity. Various topics will be discussed, including; linearized theory and gravitational radiation, spherically symmetric metrics and the Schwarzchild solution, gravitational collapse, black holes, and cosmology.
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 3045.03 or permission of the instructor
CROSS-LISTING: MATH 4650.03, PHYC 4650.03/5650.03

MATH 5660.03/4660.03: Automata and Computability.

CROSS-LISTING: MATH 4660.03, CSCI 4112.03

MATH 5670.03/4670.03: Computer Algebra.

The class will develop the algebraic basis for a symbolic computation system such as MAPLE or Mathematica. The basic topics covered will be: algorithms for the arithmetic of integers and single variable polynomials, multivariable polynomials and systems of polynomial equations, the Grobner Bases Theorem, Buchbergers Algorithm. In addition one advanced topic such as integration algorithms for elementary functions or the symbolic computation of Galois groups will be explored.
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 3030.06
CROSS-LISTING: MATH 4670.03

MATH 5680.03: Topics in Logic and Computation.

This course cvers topics of current interest in logic and/or the foundations of computation. Suitable topics include: formal logic, soundness and completeness, Goedel's incompletedness theorem; formal set theory, the Zermelo-Fraenkel axioms, non-standard models, indepencence of axions; lambda calculus and foundations of functional programming languages, proof theory, semantics.
FORMAT: Lecture
PREREQUISITE: MATH 3030.03 OR MATH 3500.03, OR CSCI 3110.03 AND CSCI 3136, or permission of the instructor.
CROSS-LISTING: MATH 4680.03

MATH 5800.03: Experimental Mathematical in Action.

The goal of this course is to present a coherent variety of accessible examples of modern mathematics where intelligent computing plays a significant role and in doing so to highlight some of the key algorithms and to teach some of the key experimental approaches.
FORMAT: Lecture, Seminar, Discussion and Lab
PREREQUISITE: MATH 3030X/Y.06 or permission of the instructor
CROSS-LISTING: MATH 4800.03, CSCI 4800.03

MATH 5900.03: Combinatorial Game Theory.

This course looks at 2-player games of strategy where there are no chance devices and both players have perfect information---Go, Chess, Checkers and Dots-And-Boxes are such games. The surprising mathematical structure underlying these games will be introduced along with the evaluation scheme and its application to specific games in the classes of hot, all-small and impartial games. If time permits, the latest developments in loopy and misere games will be covered.
PREREQUISITE: MATH 2030.03/2040.03, 2001.03/2002.03
CROSS-LISTING: MATH 4900.03

MD/PhD Programs / Combined

Registration in the Combined MD/PhD Program is suspended for the 2008/2009 academic year.

Mechanical Engineering

Location: "C1" Building
Telephone: (902) 494-3917
Fax: (902) 423-6711
Email: mechanical.engineering@dal.caf

Department Head

Professors Emeriti

Cochkanoff, O., BASc (UBC), MASc (Toronto), PhD (Iowa State), FCASI, FEIC, FC, SME, PEng, CD.

Russell, L.T., BEng (TUNS), MSc (Qu), PhD (Car), PEng.

Professors

Allen, P.L., BSc (MtA), BEng (TUNS), MESc (UWO), PhD (TUNS), PEng. Solar thermal energy utilization, heat exchangers.

Basu, P., BE (Cal), PhD (Burd), PhD (Aston), PEng. Air pollution control, recycling, heat transfer, boiler design & expert system, fluidized bed combustion.

Chuang, J.M., BSc (Nat. Taiwan Ocean), MEng (Memorial), PhD (TUNS), PEng (Naval Architecture). Numerical modelling of nonlinear free-surface flow, optimal hull form for a SWATH ship, low-cost Unix system for computational mechanics.

Hubbard, T., BSc (Dal), BEng (TUNS), PhD (CalTech), PEng. MEMS - Micro Electro Mechanical Systems.

Kalamkarov, A.L., BSc, MASc, PhD (Moscow State), DSc (Acad Sci., USSR), PEng. Stress and strength analysis, modelling, design and optimization of composite materials and smart structures.

Kujath, M.R., MSc (TU Warszawa), PhD (Polish Academy of Sciences), PEng. Mechanisms and machinery, MEMS, robotics, space mechanics.

Militzer, J., BSc (EEM Brazil), MSc (USP Brazil); PhD (Wat), PEng. Hydrodynamics of circulating fluidized bed boilers, computational fluid dynamics.

Ugursal, V.I., BSc (Bogazici), MEng, PhD (TUNS), PEng. Technoeconomic evaluation of advanced electric power generation systems, heat pump applications, residential energy consumption.

Watts, K.C., BSA, MSc (Guelph), PhD (Wat), PEng, PAg, joint appointment with Biological Engineering.

Associate Professors

Bauer, R.J., BSc (Waterloo), PhD (Toronto), PEng. Dynamics and control, grinding, flexible space structures. (Undergraduate Coordinator)

Georgiades, A.V., BEng (TUNS), MASc (TUNS), PhD (Dal). Stress analysis, fabrication and micro mechanical modeling of smart composites.

Retallack, D., BEng (TUNS), MEng, PhD (UMIST), PEng. Process simulation and design, design and implementation of MIMO control systems.

Warkentin, A., BEngMgt, MEng (McMaster), PhD (Waterloo), PEng. CAD/CAM grinding, 5-axis machining. (Graduate Coordinator)

Assistant Professors

Campregher, R., BSc, MSc (UNESP Brazil), PhD (UFU Brazil). Computational fluid dynamics, fluid-structure interaction, parallel computing.

Groulx, D., BSc, PhD, (Sherbrooke). Multiphase processes, applied heat transfer and fluid mechanics, energy conversion and conservation systems.

Koksal, M., BSc, MSc, (Middle East TU), PhD (Dal). Fluidized bed systems, modeling of multiphase flows.

Pan, Y.J., BEng (Yanshan Unv.) MEng (Zhejiang Unv.), PhD (National University of Singapore). Nonlinear systems and control, network control systems, teleoperation, electro-mechanical systems.

Adjunct Professors

Akpan, U., BSc, MSc, (Ibadan), PhD (TUNS)
Beausoleil-Morrison, I., BASc, MASc (Waterloo), PhD (U of Strathclyde)
Fung, A., BSc (Dal), BEng, MASc (TUNS), PhD (Dal), PEng
Hamdaullahpur, F., BSc, MSc (TU Istanbul), PhD (TUNS), PEng.
Hsiung, C.C., BSc (Taiwan Cheng-Kung), MSE (Mich), PhD (Calif), CEng, PEng. Naval Architecture.
Liu, K., BEng (CSUT, China), MASc (CSUT), PhD (TUNS).
McTaggart, K., BSc (QU), MEng (Western), PhD (UBC).
Mitchell, A.K., BEng, MASc, PhD (TUNS), PEng.
Qui, W., BBA, BSE, MASc (Dalian U of Tech), PhD (Dal)
Quinn, W., BSc (U. ASc Hamburg), MSc (TU Berlin), MSc, PhD (QU).
Tarnawski, MSc, PhD (TU Lodz), PEng.

I. Introduction

Mechanical Engineering covers a very broad field of professional activity in such areas as land, sea, air, and space transportation; primary and secondary manufacturing industries; power generation, utilization and control; environmental control; and industrial management. In these areas, the Mechanical Engineer may become involved with design, construction, operation, development, research, planning, sales and management. The curriculum is designed to develop an understanding of the fundamental principles of Mechanical Engineering through lecture, tutorial, and laboratory activities. Modern well-instrumented laboratories in thermofluids, energy conversion, stress analysis, vibrations, and control systems provide experience in measurements and applications to ensure a thorough understanding and appreciation of the subject matter. Classes in mathematics, engineering management and various non-technical subjects are offered to broaden the student's outlook and understanding of this profession.

Postgraduate studies in the Department are concentrated in the areas of stress analysis, heat transfer, multi-phase flow, fluid and thermal power, dynamics of rotating machines, robotics, composite materials and smart structures, MEMS, computer aided design and manufacturing and naval architecture. Research and project master's degrees as well as the doctoral degree are offered.

II. Class Descriptions

NOTE: All graduate classes are not offered every year. Class offerings depend upon faculty availability and student interest.

MECH 6010.03: Manufacturing Processes.

This course introduces the student to the fundamentals of manufacturing processes. Emphasis will be placed on metal cutting and grinding processes. Specific topics include: chip formation, cutting mechanics, tool material and geometry, temperature, heat transfer, tool wear, thermal damage, machine tool dynamics for grinding and single point machining.
INSTRUCTOR(S): A. Warkentin
FORMAT: Lecture

MECH 6100.03: Boundary Layer Theory.

The derivation of the Navier-Stokes equations and several exact solutions are considered. The boundary layer equations and some solutions for two dimensional axially symmetric flows are treated as well as non steady boundary layers.
The integral method of solution of boundary layer equations is followed by boundary layer control.
An introduction to the theory of turbulence is given.

MECH 6110.03: Turbulence in Real Fluids.

The first part of this class deals in some detail with the theory of measurements and the analysis of random data. Statistically based functions such as turbulence intensities, correlation functions, energy spectra, are examined in relation to fluid processes.
The second phase of this class examines the present level of knowledge of turbulence of fluids in rigid and visco-elastic ducts, without and with superimposed pressure gradients. Properties of real fluids are stressed and considerable emphasis is laid upon experimental results, applying the methods of measurement and analysis outlined above. Two and three dimensional anemometry techniques are examined applied.

MECH 6120.03: Computational Fluid Dynamics and Heat Transfer.

The finite difference discretization method is applied to the solution of the partial differential equations arising from the mathematical modelling of fluid flow, heat transfer and combustion processes. The equations can be parabolic, elliptic or hyperbolic. Items like convergence, stability, consistency, numerical diffusion and turbulence modelling will also be presented. The computer code PHOENICS (Copyright CHAM Ltd.) will be used to solve several sample problems.

MECH 6140.03: Fluidization Phenomena I.

The physical properties of the fluidized state, the behavior of bubbles, the flow patterns of fluids and heat and mass transfer in a bubbling fluidized bed boiler reactor.

MECH 6142.03: Steam Plant Engineering.

This class aims to provide basic fundamental and practical information to engineering students to design and operate thermal power plants. The following topics are covered: classification of steam generator; comparison of water-tube and fire-tube boilers; energy sources; nuclear and fossil fuel; fuels land combustion; thermal analysis of furnaces; superheaters, economizers, and air pre-heaters; bioler efficiency calculations; description of different types of heat exchangers; evaporators and condensers; steam generation systems; Pulverized, Cyclone, Fluidized beds; auxillary equipment (fans, stacks); control system; cooling system design; environmental considerations.
FORMAT: Lecture/design/ tutorial design/project
PREREQUISITE: ENGI 2800.03 or equivalent
CROSS-LISTING: MECH 4840.03

MECH 6145.03: Fluidization Phenomena II.

This class deals with circulating fluidized bed and fluidized bed heat transfer. It will cover design of fluidized bed reactors, heat exchangers and combustors. Mechanical design of components such as distributor, solid-field system, reactor shell and equipment control will also be covered.

MECH 6200.03: Advanced Heat Transmission I.

This class deals with advanced topics in convection heat transfer. The governing equations for forced and natural convection are derived and solved by scaling analyses. Integral and similarity solutions are also obtained for the governing equations. The development of empirical correlations for evaluating the heat transfer from commonly encountered geometries is also covered.

MECH 6210.03: Advanced Heat Transmissions II.

An advanced study of the transmission of heat by radiation. Topics covered include: physical properties of radiation, thermal radiation laws, characteristics of real and ideal systems, geometric shape factors, grey and non-grey system analysis, energy transfer in absorbing media and luminous gases, solar radiation.

MECH 6325.03: Micro-electro-mechanical Systems (MEMS).

This class deals with micro-machining and MEMS (micro-electro-mechanical systems). The following topics will be covered: scaling issues, fabrication technologies and production methods, classification and analysis of MEMS devices (both sensors and actuators). The integration of multiple devices into systems will be addressed including issues of assembly and interfacing. Micro-machining will be compared and contrasted to both micro-electronics and traditional micro-machining. The development and use of MEMS simulation and design tools will be covered.
PREREQUISITE: Approval of instructor.

MECH 6340.03: Energy Management I.

The purpose of this class is to introduce the concepts and techniques of energy management and conservation. The subjects that will be discussed are energy supply and demand, energy pricing, scope of the energy problem and approaches to provide solutions; energy auditing; improving energy utilization in space conditioning and steam, hot water and compressed air systems; energy saving opportunities in refrigeration and cooling systems; insulation; and electrical energy conservation. An inter-

disciplinary approach will be employed in this class to provide a wider understanding of the subject.

MECH 6341.03: Energy Management II.

This class is a continuation of MECH 6340. The subjects that will be discussed in this class are computer technology for energy conservation; energy saving opportunities in fired heaters and boilers; cogeneration; waste heat recovery; and synthesis of heat and power networks. Although MECH6340 is not a prerequisite for this class, it is advisable that both classes are taken to have a complete coverage of the subject.

MECH 6350.03: Advanced Engineering Design.

An undergraduate education necessarily concentrates on analysis. This class focuses on synthesis. Creativity is the engine of design and analysis is the feedback governing design. Through the media of case studies, laboratory exercises, instruction, and practice, this class studies the process of design; the business of translating societal needs into real, manufacturable objects. Lecture topics will include: the hierarchical, iterative nature of design; aids to creativity; the appropriate use of analysis; the transformation from functional space to physical space; prototype design; consumer durable versus capital equipment design; and special lectures on microprocessors in machinery, optimization, and CAD/CAM.

MECH 6420.03: Advanced Fluid Mechanics.

A general review of principle concepts and methods in fluid dynamics will be conducted. Advanced treatment with mathematical techniques for solving specific classes of fluid-flow problems will be introduced, including: surveys of governing equations and basis theories; two- and three- dimensional potential flows; surface waves; boundary-layer theory; and, shock-wave phenomenon.
PREREQUISITE: ENGM 4343.03 and MECH 3420.03 or equivalent.

MECH 6500.03: Mechanical Vibrations.

Free and forced vibrations of elastic bodies, such as beams, plates, and shells are examined. Response due to shock and random loading is introduced. Vibration measuring instrumentation is described and several laboratory experiments are carried out.
Industrial applications are studied including vibration of machinery, ships, and the response of humans to whole body vibration.

MECH 6510.03: Advanced Mechanics of Solids.

The class provides an introduction to the general equations of the theory of elasticity of an anisotropic solid. Elastic equilibrium and boundary value problem formulations are considered. The theories of thermoelasticity, viscoelasticity and plasticity are introduced. The class also provides an introduction to modeling of inhomogeneous composite solids, the effective moduli theory, and the elasticity of composite laminates. The fundamentals of fracture mechanics and applications to mechanical design are considered.
INSTRUCTOR(S): A. Kalamkarov
PREREQUISITE: ENGI 2200.03, MECH 4300.03

MECH 6521.03: Applied Dynamics.

This class begins with a review of planar kinematics and kinetics of rigid bodies. These concepts are extended to kinematics and kinetics of rigid bodies undergoing general three dimensional motion. Euler's Equations are applied to a wide range of engineering problems including vehicular and gyroscopic dynamics. Energy methods for bodies undergoing three dimensional motion are applied to multi-degree-of-freedom systems. Single-degree-of-freedom systems subjected to random and shock inputs are analyzed.
FORMAT: Lecture 2 hours, lab/tutorial 3 hours
CROSS-LISTING: MECH 4521.03

MECH 6530.03: Mechanics of Composites and Smart Structures.

The class introduces classification of composite materials, basic relations of anisotropic elasticity, and macro- and micromechanical scales of analysis. The elastic behavior of fiber reinforced composites; effective moduli theory; elasticity and strength of composite laminates are considered. Asymptotic homegenization method and its applications to mechanical modeling of composites are introduced. Smart (adaptive) structures and their constituents are discussed and the mechanical behavior of smart structures is considered.
INSTRUCTOR(S): A. Kalamkarov
FORMAT: Lecture, laboratory
PREREQUISITE: ENGI 2200.03, MECH 4300.03

MECH 6540.03: Continuum Mechanics.

This class introduces the students to the fundamental principles of continuum and applied mechanics. The class will cover tensor algebra/ calculus, strain and deformation measures (both Lagrandian and Eulerian approaches), stress, conservation laws in solid and fluid mechanics and constitutive laws in elastic materials, Newtonian fluids and viscoelastic solids.
INSTRUCTOR(S): T. Georgiades
FORMAT: Lecture and tutorial/seminar
PREREQUISITE: Stress Analysis (e.g. MECH 4300, CIVL 3700, MATL 3621), Fluid Mechanics (e.g., ENGI 2300), basic ordinaray differential equations (e.g., ENGM 2021), basic linear algera (e.g., ENGM 3361).

MECH 6560.03: Space Systems.

This class deals with the engineering design and analysis of space systems and their interrelationships. Topics include orbital mechanics, satellite pertubations, satellite actuator and sensor systems, communication facilities and networks, satellite access and coverage.
FORMAT: Lecture 3 hours, tutorial 2 hours
CROSS-LISTING: MECH 4560.03

MECH 6620.03: Identification of Systems.

The objective of this class is to introduce methods of dynamic system identification. System identification leads to development of optimal mathematical models of physical systems from experimentally collected digital data. Topics include: experiment design for identifiability, digital signal filtering, mathematical optimization, system parameter estimation, modal analysis of vibratory systems.

MECH 6640.03: Robot Mechanics.

This class provides a brief introduction to the field of Robotics, a brief review of selected topics from linear algebra, and an introduction to theoretical kinematics. The main part of the class includes such topics as: robot geometry, velocity Jacobians, derivation of equations of motion; force, manipulability, inertia and compliance analysis; position and force control, optimization of kinematic redundancy, multirobot coordination; robot calibration; performance testing and characterization. The class also provides an introduction to space robots, smart structures, and walking machines as well.
PREREQUISITE: MECH 4640.03 or equivalent

MECH 6660.03: Finite Element Method in Mechanical Design.

Class deals with the application of the finite element method to stress analysis problems encountered in mechanical design. Introduction to the finite element method is followed by the necessary relationships from linear elasticity, beam and plate theory. Various categories of structural elements are discussed in order of increasing complexity. Stresses in one- and two-dimensional trusses, beams, axisymmetric solids, and plates are considered. Finite element program is introduced and used in the class assignments.
FORMAT: Lecture 2 hours, lab/tutorial 3 hours
CROSS-LISTING: MECH 4660.03

MECH 6710.03: Computational Hydrodynamics I.

This course deals with the computational methods for 2-D and 3-D potential flow in the infinite domain. The theories of boundary integral equation (BIE), Cauchy's formula and conformal mapping are introduced. The discretization techniques for numerical solution of hydrodynamics problems are emphasized. The alternative formulation of BIE for the thin body is discussed. The body-geometry approximation with Non-Uniform Rational B-Spline (NURBS) is also covered.
PREREQUISITE: MECH 330.03, approval of the instructor

MECH 6838.03: Dynamics of Marine Vehicles.

This class deals with the dynamics of marine vehicles. Topics to be covered include: water wave theory, undamped motions in still water, coupled motions in waves, and the strip theory of ships. Throughout, the practical importance of seakeeping and wave loads to performance of marine vehicles at sea is stressed. Finally, maneuverability in still water is introduced, both in the practical and theoretical senses.
PREREQUISITE: MECH 5440.03 or Instructor's consent

MECH 6855.03: Theory of Marine Propellers.

This class begins with the theory of dimensional analysis and correlation. Propeller model design and testing is introduced including potential theory of lifting surfaces, lifting line theory of propellers, lifting surface theories, propeller selection, propeller design and strength calculations, blade vibration analysis, cavitation and its effects, wake adapted propellers, bow thrusters and other propulsion devices.

MECH 6860.03: Theory of Marine Hydrodynamics I.

This is the first of two classes providing students with an advanced background of theoretical and experimental principles in Marine/Ship Hydrodynamics. Emphasis is laid on applications of potential theory to the free-surface hydrodynamic analysis: Wave phenomena pertinent to problems in naval architectural and ocean engineering are studied. Various theories for unsteady hydrodynamic forces on floating and submerged bodies are considered. Methods for seakeeping and maneuvering analysis for marine vehicles and structures and introduced.
PREREQUISITE: ENGM 4343.03 and MECH 6830.03

MECH 6870.03: Theory of Ship Structure Analysis I.

This class provides students with theoretical methods of structural analysis for ships and ocean structures in various marine environments. It contains: probabilistic descriptions of ocean wave loads acting on ships and ocean structures; the input-output relations; responses in long and short crested seas; extreme value statistics of wave loads; variability on hull-strength modes of failure; reliability concepts and design considerations.

MECH 6910.03: Graduate Seminar I.

MENG and MASC. students in mechanical engineering will prepare and present seminars on research topics related to their thesis project. Master's students shall present a minimum of one seminar. Graduate students are required to attend all graduate seminars. Students will be evaluated on their preparation, presentation skills, ability to field questions and regular attendance. Graded pass/fail.

MECH 6950.03: Advanced Control Engineering.

The class continues to develop the students' capabilities in system simulation and feedforward/feedback control-system design and implementation. Topics include: system-parameter identification, control-system hardware, computer-based control systems, design techniques for multiple-input multiple-output systems, and adaptive control. The class is supported by computer-based simulation activities and design procedures, and by hands-on laboratory experience.
FORMAT: Lecture 3 hours, lab/tutorial 2 hours
CROSS-LISTING: MECH 4950.03

MECH 6951.03: Applied Nonlinear Control.

Advanced nonlinear control approaches are introduced to the students. Applications to highly nonlinear electro-mechanical systems are discussed. Topics include: characteristics of nonlinear systems, feedback linearization, gain scheduling, adaptive control, robust and optimal nonlinear control, sliding mode control, passivity based control, backstepping, describing function, anti-windup saturations and singular perturbations etc.
INSTRUCTOR(S): Ya-Jun Pan
FORMAT: Lecture/tutorial
PREREQUISITE: MECH 4900 or ECED 4600 or CHEE 3550

MECH 6960.03: Computational Methods in Engineering.

The class presents basic computer methods of application of mathematical tools to solve engineering problems. Numerical methods such as finite differences, series expansions, and numerical integration are introduced. Numerical solutions of ordinary and partial differential equations with applications to equilibrium, cigenvalue and propagation problems in engineering are considered. Application of mathematical libraries, X-window system and the software tools associated with the Unix system are included.
FORMAT: Lecture 2 hours, lab/tutorial 3 hours
CROSS-LISTING: MECH 4960.03

MECH 6990.00: Directed Studies in Mechanical Engineering I.

This class is available to graduate students enrolled in a Master's Degree Program in Mechanical Engineering, who wish to gain knowledge in a specific area for which no graduate-level classes are offered. Students are assigned an advisor and are required to present a formal report, or take a formal examination, at the end of the class. Registration approval is required from the Head of the Department of Mechanical Engineering.

MECH 7910.03: Graduate Seminar II.

PhD students in mechanical engineering will prepare and present seminars on research topics related to their thesis project. PhD students shall present a minimum of two seminars (one of which may be the thesis proposal). Graduate students are required to attend all graduate seminars. Students will be evaluated on their preparation, presentation skills, ability to field questions, and regular attendance. Graded pass/fail.

MECH 7990.03: Directed Studies in Mechanical Engineering II.

This class is available to graduate students enrolled in PhD Program in Mechanical Engineering who wish to gain knowledge in a specific area for which no graduate-level classes are offered. Students are assigned an advisor and are required to present a formal report, or take a formal examination, at the end of the class. Registration approval is required from the Head of the Department of Mechanical Engineering.

MECH 9000.00: Master's Thesis/Project.

MECH 9530.00: PhD Thesis.

Medical Sciences

Location: Transplantation & Immunology
Research Laboratory
10th Floor Tupper Building, Room 10-D2
Halifax, NS Canada B3H 4H7
Telephone: (902) 494-3882
Fax: (902) 494-5125

Program Coordinator

Lee, T.D.G.

I. MSc/PhD in Medical Sciences

Major advances in biomedical research are now being made in an environment where basic scientists and research-trained clinicians are interacting. There is a critical need to increase the number of such trained physicians locally, regionally, and nationally. This program is designed for persons who will become clinical specialists, but who plan careers as clinician scientists. The program allows the MD graduate to concentrate primarily on thesis research in Medical Science and bridge the gap between clinical and basic medical research. In addition, the program offers training in clinical research, which is not otherwise formally offered at this University.

Students considering this program must pay particular attention to the following requirements:

1. All students must have an MD degree from an LCME accredited Medical School and all candidates must meet the admission requirements of the Faculty of Graduate Studies.
2. Candidates must be currently registered in a Canadian Royal College Residency Program, a Residency Program in the Canadian College of Family Physicians or be an MD research fellow at a Canadian teaching hospital.
3. In most cases, candidates will already have an honours bachelor's degree in a basic science discipline, or a bachelor's degree in an appropriate discipline with some evidence of competence in a laboratory or research environment. However, it is recognised that there will be some excellent students whose preparation for their MD may not have followed this route. These candidates will be assessed by the Medical Sciences Program Committee on an individual basis based upon their past performance and suitability for graduate research in the medical sciences. Students who are judged acceptable but who have gaps in their knowledge base or relevant laboratory skills may be required to take additional coursework and should recognise that this may extend the time required to complete the program.
4. A letter from the Clinical Department Head or external funding agency confirming secure funding for the training period must accompany all applications.

II. Supervision

The program is a research-intensive program. Normally, residents applying to the Medical Sciences Graduate Program will have made mutually acceptable arrangements with a faculty member(s) for the supervision of their research prior to applying for their program at Dalhousie. Within three months of initiation of the program, a supervisory committee of qualified faculty, including the supervisor(s), will be appointed. These faculty will aid in the planning of the thesis research and be available to the student throughout the program for advice. There will be at least two meetings of the Supervisory Committee each year with the student to discuss research progress and future directions. The standards of the program will be very high and the thesis research will be of international quality. Publication of the thesis research in peer-reviewed journals is expected.

It should be noted that this program is separate from the Royal College Clinician-Investigator Program (CIP), but that the Director of the CIP sits on the Graduate Committee of the Medical Sciences Graduate Program for effective communication between the two programs. Students in the Medical Sciences Graduate Program may also register for the CIP concurrently, but there is no requirement to do so.

III. Program Requirements

At the first meeting of the Supervisory Committee, relevant course work for the student will be identified by the committee in agreement with the student and the supervisor. There is a minimum requirement of one-half credit in the basic science discipline most relevant to the research project; however, the Committee may require that additional classes be taken to provide the knowledge base required for the thesis research. In addition, regular contributions to, and attendance at, a Journal Club and a Seminar series are a requirement to ensure a firm grounding in experimental methods.

Two degree programs will be offered; but all students will initially enroll in the MSc program*, which would normally be for 2 years**. If, after one year of study, the student wishes to transfer to the PhD Program, and if his/her committee recommends such a transfer, a recommendation will be sent to the Medical Sciences Program Committee, and from it to the Faculty of Graduate Studies for consideration and approval. The PhD program would be expected to be completed within 3 years; a maximum of 5 years would be allowed. In addition, within 18 months of initiation of the Program, the student must complete a comprehensive examination, which will have an oral and a written component.

* Exceptions will be made for those Residents who already have a MSc degree in a relevant discipline. Decisions on which MSc degrees are acceptable for admission to the Medical Sciences PhD program are left up to the discretion of the Graduate Program Committee for Medical Sciences.

** flexibility for individuals with parental responsibilities will be considered.

For more information contact the Program Coordinator. Telephone: (902) 494-3882; Fax: (902) 494-5125; Email: tim.lee@dal.ca

Microbiology and Immunology

Location: Sir Charles Tupper Medical Building
Halifax, NS B3H 4H7
Telephone: (902) 494-3587
Fax (902) 494 5125

Head of Department

Marshall, J.S.

Professors

Anderson, R., PhD (Cologne)(Viral Pathogenesis)
Bortolussi, R.A., MD (Toronto) FRCP(C) Pediatrics (Neonatal Infection)
Duncan, R., PhD (Guelph) (Molecular Virology) Graduate Studies Coordinator
Hoskin, D.W., PhD (McGill) (Tumour Immunology; Cancer Biology; Apoptosis)
Issekutz, A.C., MD (Dal) FRCP(C) Pediatrics (Inflammation)
Issekutz, T.B., M.D. (Dal) Pediatrics (Inflammation and Leukocyte Traffic)
Johnston, G.C., PhD (York)(Molecular Genetics: Regulation of Proliferation)
Lee, P.W.K., PhD (Alberta) (Molecular Virology; Cancer Biology)
Lee, S.F., PhD (Guelph) (Oral Microbiology)
Lee, T.D.G., PhD(Glasgow) (Immunoregulation, Transplantation Immunology and Herbal Medicine)
Marshall, J.S., PhD (Manchester) (The role and regulation of mast cells in immune responses to bacteria, viruses and tumors. Regulation of cytokines in inflammatory bowel diseases and asthma)
Richardson, C.D., PhD (British Columbia) (Molecular Virology)
Stadnyk, A.W., PhD (McMaster) (Intestinal Inflammation; Cytokines)

Associate Professors

Barnes, C., PhD (Dal) (Molecular Genetics)
Faulkner, G., PhD (Dal) (Ultrastructure)
Garduno, R.A., PhD (Victoria) (Intracellular Pathogens)
Lin, T. -J., PhD (China) (Mechanisms of Host Defense Against Pathogen Infection)
West, K.A., MD (London), Medicine (Transplantation and Histocompatibility)

Assistant Professors

Berman, J.N., MD (Toronto) Pediatrics
Davidson, R.J., PhD (Manitoba) (Antimicrobial Mechanisms of Action and Resistance)
Easton, A.S., PhD (London), MBBS (London) (Blood-brain barrier)
Johnston, B., PhD (Calgary) (Inflammation and Immune Response)
Legare, J.F., MD (McGill) (Transplantation and Mechanism of Heart Failure)
Li, Y.H., PhD (Manitoba) (Bacteriology and Molecular Biology)
McCormick, C., PhD (British Columbia) (Viral Oncology)
Thomas, N., PhD (Queen's) (Molecular Bacterial Pathogenesis)
Wang, J., PhD (McMaster) (Mucosal Immunology and Vaccinology)

Adjunct Professors

Douglas, S. E., PhD (Dal) (Molecular Genetics, Genomics, Fish Innate Immunity
Reith, M.E., PhD (Washington) Molecular Pathogenesis)
Stoltz, D.B., PhD (McMaster) (Insect Virology)

Senior Instructor

Murray, L.E., PhD (Dal) (Molecular Genetics)

I. Disciplines Within Microbiology and Immunology

Graduate degrees can be pursued in the areas of Virology, Bacteriology, Microbial Pathogenesis, Microbial Genetics, Molecular Genetics, Cancer Biology, and Cellular and Molecular Immunology. Graduate students are expected to acquire a conceptual understanding of the disciplines in microbiology and immunology and an in depth knowledge of their particular area of specialization. Notwithstanding this, the existence of specified streams in Cellular and Molecular Immunology, Virology, Bacteriology, Microbial Pathogenesis and Molecular Genetics in the Department may allow well-qualified students, with at least minimal training in Microbiology and Immunology, but a strong background in the appropriate subject area, to concentrate their studies.

II. Admission Requirements

In conjunction with the general requirements for admission, candidates must have received sound basic instruction in Biochemistry and Cell Biology and four credits in a relevant discipline or disciplines with a B+ average or better.

III. Degree Programs

A. Master of Science (MSc)

For minimum time required to complete this program, see the Faculty of Graduate Studies Regulations in this calendar. Participation in seminars and journal clubs (one of MICI 5001.06, 5006.06 or 5007.06) is required. The class requirements for each MSc candidate, normally consisting of 1.5-2 credits, are determined by consultation between the student and the supervisory committee, and must be approved by the departmental Graduate Studies Committee. A research project must be completed, the result of which will be embodied in a thesis.

B. Doctor of Philosophy (PhD)

For minimum time required to complete this program, see the Faculty of Graduate Studies Regulations in this calendar. Participation in seminars and journal clubs (one of MICI 5001.06, 5006.06 or 5007.06) is required. The class requirements for each PhD candidate, normally consisting of 1.5-2 credits, are determined by consultation between the student and the supervisory committee, and must be approved by the departmental Graduate Studies Committee. Comprehensive knowledge of the area of specialization must be demonstrated and will be assessed by written and oral examination.

Research of a high calibre is required, the results of which must be embodied in a thesis which makes a significant contribution to knowledge in the chosen field. An oral defence of the thesis before an external examiner is required.

IV. Class Descriptions

MICI 5001.06: Cancer Biology Seminars.

A seminar based class in which students prepare and present papers from the recent cancer biology literature. Each student presents one paper per term and submits a written one-page summary and critique. Following each presentation, active discussion of the paper and relevant issues is encouraged from all participants, so as to discuss the merits, strengths and weaknesses and scientific importance of the paper presented.
INSTRUCTOR(S): P. Lee

MICI 5003.03: Special Topics in Microbiology and Immunology.

This class allows students to investigate, under the supervision of a faculty member, an area of microbiology or immunology that is not covered in formal classes. The topics in which the Department can offer instruction are dependent on the research interests and expertise of department members. Student must consult with the Graduate Studies Coordinator prior to enrolling in this class.
INSTRUCTOR(S): R. Duncan
FORMAT: Seminar and discussion

MICI 5006.06: Topics in Advanced Immunology.

The class is seminar based with weekly presentations of a recent paper in a selected area of Immunology. The class will cover aspects of cellular and molecular immunology in areas such as (but not restricted to) cancer, transplantation, inflammatory diseases, autoimmunity, allergy, immunological and infectious diseases. All MSc students present two papers
in the first academic year and one in the second academic year. PhD students present two papers in the first year and one per year in the following years. The student should provide a learning objective for the presentation. The learning objective should include background knowledge
and the novelty of the paper. The students are expected to have a broad introduction of the background of the paper. Point out what knowledge is lacking in the literature, which leads to the current study. The novelty of the paper should be emphasized. The student is then expected to review the experimentation methods and data analysis. This is a pass/fail class with grading dependent on the quality of the student presentation, participation of discussion and attendance (at least 80% of attendance is expected).
INSTRUCTOR(S): T. J. Lin

MICI 5007.06: Advanced Topics in Molecular Pathogenesis.

A seminar-based class in which students prepare and present papers from the recent literature. Papers are selected from topical and sometimes controversial areas in bacterial and viral pathogenesis. Each student presents one paper per term and submits a written one-page summary and critique. Following each presentation, active discussion of the paper and relevant topics is encouraged from all participants, so as to evaluate the merits, strengths and weaknesses and scientific importance of the paper presented. Evaluation is a pass/fail based on the quality of student presentations, written critiques and contributions to discussion.
INSTRUCTOR(S): R. Garduno

MICI 5027.03: Molecular Mechanisms of Cancer.

This class focuses on the molecular mechanisms of cancer and consists of lectures and student presentations. Topics include: receptors and downstream signaling, oncogenes and tumor suppressors, cancer metastasis and angiogenesis, cell cycle control and apoptosis.
INSTRUCTOR(S): P. Lee and D. Waisman
FORMAT: Lecture/student presentations/discussion
PREREQUISITE: Minimum grades of B+ in a 3000 level Microbiology, Pathology or Biochemistry class. Permission of instructor required.
CROSS-LISTING: MICI 4027.03/PATH 5027.03/BIOC 4027.03

MICI 5038.03: Molecular Biology of Yeast.

A seminar -based class in which students prepare and present papers from the recent molecular biology literature. Each student presents one paper per term and submits a written one-page summary and critique. Following each presentation, active discussion of the paper and relevant issues is encouraged from all participants, so as to discuss the merits, strengths and scientific importance of the paper presented. This is a pass/fail class based on the quality of student presentations, written critiques and contributions to discussion.
INSTRUCTOR(S): C. Barnes
FORMAT: Seminar

MICI 5100.03: Processes and Mediators of Inflammation.

To provide students with an in-depth understanding of the major mechanisms of inflammation at a molecular and cellular level; to introduce students to the current research questions and emerging methods of treatment for inflammation; to develop student critical appraisal skills as they relate to the current scientific literature in this area.
INSTRUCTOR(S): J. Marshall
FORMAT: Lecture/presentation/discussion
CROSS-LISTING: MICI 4100.03, PATH 5100.03

MICI 5114.03: Advanced Topics in Molecular and Medical Virology.

A class designed to look in detail at selected aspects of molecular and medical virology. The class is based on student presentation of current literature, in combination with introductory lectures and paper discussions.
INSTRUCTOR(S): R. Duncan
FORMAT: Lecture/presentation/discussion
CROSS-LISTING: MICI 4114.03

MICI 5116.03: Current Topics in Mucosal Immunology.

The mucosal immune system maintains a state of tolerance to environmental antigens while mounting a rapid and robust specific immune response to infectious agents. This balance has led to certain physical and functional characteristics unique to mucosal sites. The class will consist of lectures and student-led presentations and discussions of current publications (chosen by the course coordinator). Each week will be focused on a single theme but covering topics in the gastrointestinal tract and respiratory and genitourinary systems. Weekly themes will include, oral tolerance, intraepithelial lymphocytes, models of intestinal inflammatory diseases, parabiotics, role of IgA, vaccines use in respiratory diseases, urinary tract infection and aspects of reproductive immunology. Students will typically present three publications in the class. Evaluations are based on student presentations (30%), written summaries of the discussion following (their own) presentations (20%), participation in the discussions of other student presentations (10%) and a research report or grant on a topic chosen by the student (40%). There are no exams.
INSTRUCTOR(S): A. Stadnyk
CROSS-LISTING: MICI 4116.03

MICI 5118.03: Molecular Bacterial Pathogenesis.

An advanced class on the molecular basis of bacterial pathogenesis. The class will use selected bacterial pathogens to develop basic principles regarding genes encoding virulence factors, their regulation and the molecular function of their gene products in surface colonization, invasion, intracellular growth and toxin production. The class may include student presentations of reviews and original research papers, and will emphasize the use of modern molecular biological tools in problem solving.
INSTRUCTOR(S): R. Garduno
FORMAT: Lecture, student presentations, discussion
CROSS-LISTING: MICI 4118.03

MICI 5302.03: Molecular Immunology.

An advanced class which investigates the molecules involved in the generation and expression of inflammation and regulation of immune responses. Topics typically include the molecular regulation of cytokines, the generation of antibody diversity, by immunogobulin gene rearrangement, class switching, the structure and function of cell surface receptors such as the T cell antigen receptor, MHC and adhesion molecules, receptor signaling and the genetics of immune regulation.
INSTRUCTOR(S): A. Stadnyk
FORMAT: Lecture, student presentations, discussion
CROSS-LISTING: MICI 4302.03, BIOL 5302.03, BIOL 4302.03

MICI 5601.03: Laboratory Techniques in Molecular Biology I.

This class will consist of 2 laboratory modules (each of 4 weeks duration, one full day per week) and a scientific writing module (15 hours in total of tutorials and computer-based assignments) organized collaboratively by the departments of Biochemistry & Molecular Biology and Microbiology & Immunology. A choice of modules is offered in 2 lab sections covering techniques used in the study of molecular biology, protein structure-function, and specific metabolic processes. This class is open to senior undergraduate students and the number of places in the class is limited. Priority for enrolment is given to undergraduate students for whom this is a required class for their degree program. Graduate students may select their 2 lab modules, subject to availability of space. Students may not necessarily be assigned to the modules of their first choice but every effort will be made to accommodate those needing the techniques provided in a

specific module. Students must obtain a class outline from the Biochemistry & Molecular Biology Office prior to registration and attend the organizational meeting, the date of which will be indicated in the Registration Timetable.
INSTRUCTOR(S): L. Murray and P. Liu
FORMAT: Eight 6 hour laboratories and three 5 hour tutorials/computer assignments
PREREQUISITE: Consent of the coordinator
CROSS-LISTING: MICI 4601.03, BIOC 4603.03, BIOC 5603.03

MICI 5602.03: Laboratory Techniques in Molecular Biology II.

This class will consist of 2 laboratory modules (each of 4 weeks duration, one full day per week) and a scientific writing module (15 hours in total of tutorials and computer-based assignments) organized collaboratively by the departments of Biochemistry & Molecular Biology and Microbiology & Immunology. A choice of modules is offered in 2 lab sections covering techniques used in the study of molecular biology, protein structure-function, and specific metabolic processes. This class is open to senior undergraduate students and the number of places in the class is limited. Priority for enrolment is given to undergraduate students for whom this is a required class for their degree program. Graduate students may select their 2 lab modules, subject to availability of space. Students may not necessarily be assigned to the modules of their first choice but every effort will be made to accommodate those needing the techniques provided in a specific module. Students must obtain a class outline from the Biochemistry & Molecular Biology Office and contact course coordinator prior to registration.
INSTRUCTOR(S): L. Murray and P. Liu
FORMAT: Eight 6 hour laboratories and three 5 hour tutorials/computer assignments
PREREQUISITE: Consent of the coordinator
CROSS-LISTING: MICI 4602.03

MICI 5610.06: Scientific Writing and Advanced Laboratory in Biochemical Techniques.

This class will consist of a series of laboratory modules (3 modules each of 4 weeks' duration, 1 day per week or 72 hours in total with limited flexibility to accommodate the need to attend other classes) and tutorials with computer-based assignments designed to teach scientific writing techniques (15 hours in total). The class is organized collaboratively by the Departments of Biochemistry & Molecular Biology and Microbiology & Immunology. A choice of modules will be offered in 3 sections covering techniques used in the study of molecular biology, protein structure-function and specific metabolic processes. This class is open to senior undergraduate students and the number of places in the class is limited. Priority for enrolment is given to undergraduates for whom this is a required component of their degree program. Graduate students may select their 3 lab modules from any section or sections, subject to availability of space. Students may not necessarily be assigned to a module of their first choice but every effort is made to accommodate those needing techniques provided by a specific module. Students must obtain a class outline from the Biochemistry & Molecular Biology Department office prior to registration and attend the organizational meeting, the date of which will be indicated in the Registration Timetable.
COORDINATORS: P. Liu and L. Murray

NOTE: MICI 5601 and MICI 5602 is equivalent to MICI 5610
INSTRUCTOR(S): Faculty members of the Departments of Biochemistry & Molecular Biology and Microbiology & Immunology
FORMAT: Twelve 6-hour labs and three 3-hour tutorials/computer assignments
PREREQUISITE: Consent of the coordinator
CROSS-LISTING: MICI 4610.06, BIOC 5610.06, BIOC 4610.06, BIOL 4013.06, BIOL 5610.06

MICI 9000.00: MSc Thesis.

MICI 9530.00: PhD Thesis.

Neuroscience

Contact: Dr. K. Semba
Department of Anatomy and Neurobiology
Telephone: (902) 494-2009
Fax: (902) 494-1212
Email: k.semba@dal.ca
or Graduate Coordinator of individual Departments

Faculty Advisors

Department of Anatomy & Neurobiology

Allen, G.V., PhD (Dal)
Baldridge, W.H., PhD (McMaster) (joint appointment in Ophthalmology)
Brownstone, R., MD, PhD (Manitoba) (primary appointment in Neurosurgery)
Clarke, D., MD, PhD (McGill) (primary appointment in Neurosurgery)
Currie, R.W., PhD (Man)
Darvesh, S., MD, PhD (UNB) (primary appointment in Neurology)
Hopkins, D.A., PhD (McMaster)
Kablar, B., MD (Zagreb), PhD (Zagreb and Pisa)
Leslie, R.A., PhD (Cambridge)
Marsh, D.R., PhD (Alberta)
Mendez, I.M., MD, PhD (UWO) (primary appointment in Neurosurgery).
Neumann, P.E., MD (Brown)
Rafuse, V., PhD (Alberta)
Rutherford, J.G., PhD (SUNY)
Semba, K., PhD (Rutgers)
Smith, F.M., PhD (UBC)
Wassersug, R.W., PhD (Chicago)

Department of Biochemistry and Molecular Biology

Byers, D.M., PhD (Alta)
Cook, H.W., PhD. (Dal)
Karten, B., PhD (Graz)

Department of Pharmacology

Denovan-Wright, E., PhD (Dal)
Downie, J., PhD (Man.)
Howlett, S.E., PhD (Memorial)
Hung, O., MD (Dal) (primary appointment in Anaesthesiology)
Kelly, M., PhD (Southampton)
Robertson, G.S., PhD (Dalhousie)
Robertson, H.A., PhD (Cantab)
Sawynok, J., PhD (Queen's)

Department of Physiology & Biophysics

Barnes, S., PhD (Berkley)
Chauhan, B.C., PhD (Wales) (primary appointment in Ophthalmology).
Croll, R.P., PhD (McGill)
Fine, A., VMD, PhD (Penn)
French, A.S., PhD (Essex)
Guernsey, D.L., PhD (Hawaii) (primary appointment in Pathology).
Krueger, S. PhD (Zurich)
Murphy, M.G., PhD (Dalhousie)
Pelzer, D. J., MD (Heidelberg)
Rasmusson, D.D., PhD (Dalhousie)
Torkkeli, P., PhD (Alberta)
Wilkinson, M., PhD (London) (joint appointment in Obstetrics/Gynecology)

Department of Psychology

Adamo, S.A., PhD (McGill)
Barrett, S., PhD (McGill)
Brown, R.E., PhD (Dalhousie)
Connolly, J.F., PhD (London)
Duffy, K. R., PhD (McMaster)
Eskes, G.A., PhD (Berkeley) (primary appointment in Psychiatry).
Fentress, J.C., PhD (Cantab.)
Gadbois, S., PhD (Dalhousie)
Klein, R.M., PhD (Oregon)
LoLordo, V.M., PhD (Pennsylvania)
McGrath, P.J., PhD (Queen's)
McMullen, P.A., PhD (Waterloo)
Meinertzhagen, I.A., PhD (St. Andrews)
Mitchell, D.E., PhD (Berkeley)
Newman, A., PhD (Oregon)
Perrot-Sinal, T., PhD (UWO)
Phillips, D.P., PhD (Monash)
Phillmore, L., PhD (Queen's)
Rusak, B., PhD (Berkeley) (joint appointment in Psychiatry)
Schellinck, H., PhD (Dalhousie)
Shaw, S.R., PhD (St. Andrews)
Taylor-Helmick, T., PhD (Dal)

In addition to the above, over 30 members of clinical departments and divisions in the Faculty of Medicine (Anaesthesiology, Pathology, Ophthalmology, Geriatric Medicine, Neurology, Neurosurgery, Psychiatry, Physical Medicine and Rehabilitation, and Urology), Faculty of Computer Science, and the Department of Electrical and Computer Engineering are involved in neuroscience research.

The University offers a graduate program leading to the Master of Science and/or Doctor of Philosophy degree. This interdisciplinary program is coordinated with the departments of Anatomy and Neurobiology, Biochemistry and Molecular Biology, Pharmacology, Physiology and Biophysics, and Psychology with the degree being awarded in Anatomy/Neuroscience, Biochemistry/Neuroscience, etc. Approximately fifty faculty members in these five departments are involved in Neuroscience research and can serve as supervisors in this program. The student must be accepted first by the Departmental Graduate Program Committee and then by the Neuroscience Program Committee.

The program is designed to give the student a broad knowledge of the field of Neuroscience in addition to specialized training in one field of research. Normally, the student must take the Principles of Neuroscience (NESC6100) during his or her first year; this replaces some of the departmental class requirements. The student's Supervisory Committee will be selected by the Departmental Graduate Program Committee and the Neuroscience Program Committee; the Supervisory Committee is primarily responsible for designing and approving the program that will best meet the student's needs.

I. Admission Requirements

Students apply to the Neuroscience Program and to one of the five departments (see above) in which they will perform their research. They must be accepted by both the department and the Neuroscience Program. Students must indicate the department with which they plan to affiliate, e.g. Neuroscience (Psychology). In addition, students who are already in the graduate program of one of the five departments may apply for a transfer. All students must have a 4-year honours bachelor's degree with an average of A- or better in two most recent years, or equivalent. Students with a BSc or BA degree wishing to do a PhD are usually registered initially in the MSc program, but may be considered for transfer into the PhD program after successful completion of the MSc class requirements. Students with strong undergraduate training in Neuroscience may apply to have some of the class requirements waived.

II. Class Descriptions

ANAT 5100.06: Human Neuroanatomy.

This class is designed to acquaint the student with the anatomy and organization of the human central nervous system. Lectures dealing with cellular morphology; gross and microscopic anatomy of the spinal cord, brain stem, diencephalon (thalamus, hypothalamus, etc.), and telencephalon (cerebral hemispheres); blood supply of the CNS, meninges, and cerebrospinal fluid are presented. Laboratory exercises involve exposure to aspects of microscopic and ultrastructural morphology of the CNS, examination of selected cross sections of spinal cord, brain stem, and diecephalon and telencephalon, and dissection of the brain. In addition, students participate in a series of discussion sessions held once every week. Outside readings on selected topics are assigned, and form the basis for the subjects considered in these sessions. Students take written and practical examinations, give presentations and are expected to submit a term paper on a topic agreed upon in consultation with the instructor.
COORDINATOR: K. Semba

ANAT 5609.03: Anatomical and Molecular Neuropharmacology of the Basal Ganglia: The Scientific Basis for Grafting.

This will be a graduate seminar and lecture class in the structure and function of the basal ganglia with particular reference to the use of neural grafting techniques to reconstruct neuronal circuits involved in control of movement. The class will first examine in detail the neuroanatomical connections of the basal ganglia and their physiological role in the normal individual. The pathological changes in the basal ganglia during Parkinson's disease will be studied in the classroom and in the clinic. There will be extensive advanced discussion of the role of dopamine and dopamine receptors and the neuropharmacological basis for the treatment of Parkinson's disease using drugs. The importance of drugs, especially dopaminergic agonists, in understanding the function of the basal ganglia will be considered as well as the role of D1 and D2 dopamine receptor mechanisms in the function of neural grafts. Finally, there will be a number of seminar/lectures on the theory, practice and problems of neural transplantation in animals and in man, especially as related to Parkinson's disease.
COORDINATOR: I. Mendez
ENROLLMENT: Graduate Students in Neuroscience, post-doctoral fellows and residents in post-graduate programs in the Faculty of Medicine
CROSS-LISTING: PHAC 5609.03

CSCI 6508.03: Fundamentals of Computational Neuroscience.

This course introduces the principles of information processing in the brain, including the functionality of single neurons, networks of neurons, and large-scale neural architectures for specific cognitive functions. Specific topics include information theory, memory, object recognition, adaptive systems, vision, motor control, and an introduction to MATLAB.
INSTRUCTOR(S): Trappenberg, T.P.
FORMAT: Lecture
PREREQUISITE: Permission of the instructor

NESC 5060.03: Neurobiology of Neurological Disorders.

Please see class description for ANAT 5060.03 in the Anatomy and Neurobiology section of this calendar.

NESC 5070.03: Chemical Neurobiology.

Please see class description for ANAT 5070.03 in the Anatomy and Neurobiology section of this calendar.
CROSS-LISTING: NESC 4070.03, PHYL 5494.03

NESC 5603.03: Neuropharmacology of Pain.

CROSS-LISTING: PHAC 5603.03

NESC 5605.03: Role of the Brain's Immune/ Inflammatory System in Disease.

CROSS-LISTING: PHAC 5605.03

NESC 5619.03: The Autonomic Nervous System and its Pharmacology.

CROSS-LISTING: PHAC 5619.03

NESC 6071.03: Topics in Behavioral Neuroscience.

This seminar class covers contemporary, fundamental topics in physiological psychology, including methods, research and/or theory. Various topics such as brain mechanisms of reinforcement, hormones and behavior, and biological rhythms, will be covered in different years.
INSTRUCTOR(S): R.E. Brown
FORMAT: Seminar
PREREQUISITE: PSYO or NESC graduate student
CROSS-LISTING: NESC 6071.03

NESC 6100X/Y.06: Principles of Neuroscience.

This is the core class for all first year Neuroscience graduate students. The first term will focus on cellular and molecular neurobiology and will cover topics such as membrane potentials, synaptic transmission, second messengers, trophic factors, cell differentiation and neurodegeneration. The second term will focus on systems and behavioral neurobiology and will cover topics such as visual and somatosensory systems, motor program generation, autonomic and neuroendocrine functions, motivation, learning, circadian hythmicity and sleep/wake cycles and cognitive neuroscience. Evaluation will be based on several oral and written presentations prepared throughout the year, and grant proposals.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will only be given if both are completed consecutively.
INSTRUCTOR(S): S. Barnes, K. Semba, J. Downie, V. Rafuse

NESC 6101.03: Principles of Neuroscience: Cellular and Molecular Neuroscience.

NESC 6102.03: Principles of Neuroscience: Systems and Behavioral Neuroscience.

Neuroscience 6101.03 and 6102.03 are Neuroscience 6100X/Y.06 divided into terms A and B for suitable incorporation into non-Neuroscience programs. Please see class description of NESC 6100X/Y.06.

PHAC 5405.03: Advanced Pharmacology.

This required class is a vehicle for graduate students to gain practical familiarity with research level concepts in receptor pharmacology. The main theme is analysis of receptor-mediated events, both in terms of the interaction of a drug at its binding site and in terms of the transduction of that initial signal. Both classical and modern molecular approaches will be discussed. We will also consider related drug discovery strategies. The class has two sessions/week, one a didactic session to introduce concepts and the second a workshop session for discussion of practical assignments.
PREREQUISITE: Normally required PHAC 5406 and PHAC 5407 (Grade of B- or higher)

PHYL 5518.03: Ligand-gated Ion Channels.

This half-credit class analyzes the basic properties of ligand-gated ion channels and ATP Binding Cassette (ABC) transporters in human diseases, with special emphasis on Cystic Fibrosis.
INSTRUCTOR(S): V. Chappe
PREREQUISITE: Permission of the Director

PHYL 5519.03: Molecular Physiology of Ion Channels.

This class focuses on the molecular properties of ion channels, and includes an overview of the techniques used to study ion channel structure and function, ion permeation and selectivity, channel gating and modulation, the mechanisms by which channels are affected by drugs and toxins, and genetic diseases causing channel dysfunction.
INSTRUCTOR(S): P. Linsdell
FORMAT: Lectures/student presentations
PREREQUISITE: PHYL 3320.03 or 4327.03 or equivalent plus permission of the class director

PHYL 5521.03: Molecular Physiology.

This is a lecture/seminar class designed to give the student an in--depth exposure to contemporary concepts of the physiology of intracellular communications. Topics include transmembrane and intracellular receptors, ion channels, molecular adaptor proteins, signal transduction pathways and signal cross--talk. The class consists of lectures, guided reading and student presentations of recent research papers in the field. Evaluation is based on participation and presentations (50%), and on a written paper in the format of a research grant application.
INSTRUCTOR(S): P.R. Murphy (Director) and staff
FORMAT: Lecture/seminar and guided reading
PREREQUISITE: BIOC 4301.03 or permission of the class director

PSYO 6051.03: Neural Basis of Perception.

This seminar class explores the correlations between 1) stimulus properties and neural responses produced by sensory stimulation and 2) the neural coding of environmental events and the behaviors that may be produced in the context of these events. These correlations will be studied within the auditory, visual and tactile modalities.
INSTRUCTOR(S): D.E. Mitchell, D. Phillips

PSYO 6160.03: Comparative Psychology.

Different topics in comparative psychology (such as kin selection, parental behavior, hormonal control of behavior, olfaction and behavior) are covered in seminar format.

PSYO 6218.03: Topics in Psychopharmacology.

This class examines the neural and behavioural effects of drugs. The agonist and antagonist actions of drugs on receptors for neurotransmitters and the effects of drugs on neurotransmitter synthesis, storage, release and deactivation are covered. Aimed specifically at psychologists, the class focuses on the use of drugs to treat clinical disorders such as depression, schizophrenia, Alzheimer's disease, etc.

PSYO 6313.03: Topics in Cognitive Psychology.

Varied topics in cognitive psychology (such as theories of attention, memory and amnesia, cognitive inhibition) are covered in a seminar format.
INSTRUCTOR(S): R. Klein, P. McMullen

PSYO 6800.03: Clinical Neuropsychology.

This class emphasizes the development of a knowledge base by surveying several aspects of clinical neuropsychology. Topics include neuroanatomy, neurological exam, investigations and diseases, models of neuropsychological assessment, dementia, epilepsy, localization of function, cognitive remediation, theories of aphasia, amnesia, and agnosia.
INSTRUCTOR(S): J. McGlone

Nursing

Location: Forrest Building, First Floor
5869 University Avenue
Halifax, NS B3H 3J5
Telephone: (902) 494-2535
Fax: (902) 494-3487
Website: http://nursing.dal.ca

Director

Sullivan, P., BScN (MSVU), MSc (Boston), PhD (Alberta), RN. Maternal-child, women's and family health, families in conflict, international health and development.

Associate Director Graduate Programs

Martin-Misener, R., DOCHN, BScN, MN (Dal), PhD (Calgary), RN, NP. Nurse Practitioners, primary health care, rural/northern health.

Associate Directors Undergraduate Programs

Foster, S., BN (Mem), MN (Dal), RN. Mental health, qualitative research.
Wittstock, L., BScN (StFX), MN (Dal), RN. School health.

Professors

Downe-Wamboldt, B.L., DipPH, BN, MEd (Dal), PhD (Texas-Austin), RN. Stress and coping, meaning of illness, psychosocial adjustments to chronic and life-threatening illnesses, content analysis, quantitative analysis.
Sullivan, P., BScN (MSVU), MSc (Boston), PhD (Alberta), RN. Maternal-child, women's and family health, families in conflict international health and development.
Tomblin Murphy, G., BN, MN (Dal), PhD (Toronto), RN. Health policy, health human resource planning/modelling, healthcare delivery models in relation to system, provider, and health outcomes.

Associate Professors

Etowa, J., BScN (Dal), MN (Dal), PhD (Calgary), RN, RM, IBCLC. Perinatal nursing, midwifery, breastfeeding.
Hughes, J.M., BN (Dal), MS (Boston), PhD (McGill), RN. Family violence: child abuse/maltreatment, mother-child interaction/parenting, empathy, mental health issues/policy, autonomy/resiliency.
McFetridge-Durdle, J., BN, MN (Dal), PhD (Florida), RN. Ambulatory hemodynamics and blood pressure regulation in women with heart disease.
Meagher-Stewart, D., BScN (MSVU), MHSc (McMaster), PhD (Toronto), RN. Community/public health, women's health, nurses' worklife issues, primary health care/community development, qualitative and feminist perspectives.
Melanson, P., BScN (Ottawa), MN (Dal), RN. Chronic illness, coping, elder abuse.

Assistant Professors

Aston, M,. BScN, MEd (Queen's), PhD (Toronto), RN. Community health nursing, family nursing, maternal, child and infant care, critical pedagogy, feminist research, poststructuralism.
Edgecombe, N. BN (Lethbridge), MN (Alberta), PhD (Alberta), RN. Health issues of the Inuit population, culturally appropriate interventions.
Gilbert, L. BScN, MBA (S.ILL), MSN (Case Western), GNP. Knowledge, beliefs and attitudes of ancillary staff in nursing homes regarding tube feeding as an aspect of end-of-life care for dementia patients.
Goldberg, L. BA, MA (Dal), PhD (Alberta), RN. Perinatal nursing, feminist phenomenology, embodied practice, and nursing philosophy.
Latimer, M., BA (MtA), BScN (Dal, MN (Dal), PhD (McGill), RN. Pediatric pain care, nurses' worklife and patient outcomes, knowledge translation, organizational research.
Macdonald, M. BN, MScN (Shane), PhD (San Diego), RN. Difficult nurse-patient encounters, SARS, home health care.
Martin-Misener, R., DOCHN, BScN, MN (Dal), PhD (Calgary), RN, NP. Nurse Practitioners, primary health care, rural/northern health.
McLeod, D. BN, MN (Dal), PhD (Calgary), RN. Psychosocial oncology, couple and family interventions, sexuality, spirituality and suffering, illness narratives, hermeneutic and interpretive methodologies.
Mercer, M., BN (UNB), MN (Dal), RN. Children and families, coping with chronic illness, psychosocial oncology.
Murphy, A. BSc (Pharm) (Dal), PharmD (UBC). Pharmacotherapeutics, optimal prescribing, nurse practitioners, interdisciplinary e-learning, knowledge utilization.
Murphy, N., BN (Dal), MScN (UBC), RN. Mental health/psychiatric nursing, citizen participation in health policy making.
Snelgrove-Clarke, E. BN (Mem), MN (Dal), RN.
Steenbeek, A. BScN, MScN, PhD (UBC), RN. Infectious diseases among Inuit and First Nations populations.
Thibeault, C., BScN (MSVU), MN (MUN), RN. Nursing adults with severe mental illness. Mental health outcomes, nurse-patient relationship in acute psychiatric settings, inpatient psychiatric milieu.
Vukic, A., BN, MN (Dal), RN. Multicultural, community and family health, qualitative and ethnographic methodologies.
Wight Moffatt, F., BN (MUN), MN (Boston C), RN. Childbearing families, stressors and anxiety in pregnancy, psychology and physiology of women with high-risk pregnancies, fetal health assessment, perinatal loss/grief.

Adjunct Associate Professor (Research)

Breau, L., BA (Mount A), PhD (Dal)

Lecturer

O'Leary, S., DPH (UBC), DOCHN, BScN (Dal), MS (N Dakota), RN, NP. Nurse Practitioner.

I. Admission Requirements/Deadlines

A. Master of Nursing (MN)

All applicants must be licensed to practice as registered nurse (active practitioner) in a province in Canada or in a foreign country. Applicants must have a 4-year Bachelor's degree or its equivalent with a minimum "B" standing. Basic preparation including work experience within one of the clinical foci of the program is required, as are introductory classes in research, statistics, community nursing, and family nursing.
The application deadline for the Master of Nursing is April 1.

B. Master of Nursing/Master of Health Services Administration (MN/MHSA)

Applicants must apply to both the School of Nursing and the School of Health Services Administration and must satisfy the entrance requirements of both programs. Applicants must take the Graduate Management Admission Test (GMAT) and have the results forwarded to the Coordinator of the Graduate Program, Health Services Administration, prior to the application deadline.

C. PhD (Nursing)

All applicants must be licensed to practice as a registered nurse (active practitioner) in a province in Canada or in a foreign country. Applicants must have a first-class Masters degree in nursing or a relevant discipline or its equivalent from a recognized university. Applicants must have the support of a faculty member who has agreed to be their thesis supervisor.
The application deadline for the PhD (Nursing) is February 1.

II. Degree Programs

A. Master of Nursing (MN)

Dalhousie University School of Nursing offers a Master of Nursing program that is framed within a philosophy of primary health care that recognizes the unique strengths and contributions of individuals, families, and communities. It is a 36-credit hour research- and practice-based

program which prepares students to be leaders in professional nursing and provides a solid foundation for doctoral studies.

There are two phases to the program. In the first phase, students complete required and elective courses. In the second phase, students must choose one of three program options: thesis, health policy practicum, or nurse practitioner (for available specialties, consult department):

a. A thesis is intended for those students seeking to conduct independent and/or collaborative research.
b. A health policy practicum is intended for those students seeking to increase knowledge and skills in health care policy development, implementation or evaluation.
c. A nurse practitioner option is intended for those students seeking preparation as an advanced nurse practitioner.

Prospective applicants are encouraged to consult the School of Nursing to identify specific clinical offerings in any academic year. Elective class(es), from a variety of fields, may be chosen in consultation with the academic advisor.

Non-nursing electives may be taken at other universities (prior approval must be obtained from the School of Nursing). Graduate nursing classes (excepting specific nurse practitioner courses) are also offered by distance education modes to other centres. Consult department for details.

B. Master of Nursing with Master of Health Services Administration (MN/MHSA)

The combined MN/MHSA program is a 78-credit hour program which enables students to select classes leading to the degrees of Master of Nursing and Master of Health Services Administration. The MN/MHSA program is designed to enable students to:

- Advance knowledge in the area of nursing management;
- Analyze, implement, and evaluate theories and models relevant to nursing;
- Conduct independent and/or collaborative research;
- Work collaboratively with other health professions in planning, implementing, and evaluating health care; and
- Demonstrate leadership in nursing and society.

The method of delivery includes traditional classroom seminar/classes, professional clinical experiences, a residency in administration in a nursing area, and a thesis with an administration focus. The thesis committee will include faculty committee members from the Schools of Nursing and/or Health Services Administration. The integrity of both programs is maintained by the design of the 78 credit hour MN/MHSA program; however, the number of credits required is reduced by electing to take this joint program.

C. PhD (Nursing)

The goal of the PhD (Nursing) program is to prepare nurse scholars who will provide leadership in the advancement of nursing knowledge, nursing theory and practice, and health policy through scholarly research and the dissemination of research findings.

The orientation of the doctoral program is on the short and long term impacts of nursing practices and health outcomes at the individual, family, community, and/or population levels, or women's health outcomes specifically. The required classes and the doctoral seminar provide forums to analyse, discuss, and critique the concepts of health outcomes and health and social policies from the perspective of nursing practice. Health related policy is addressed through the thesis, doctoral seminars, and classes in the student's substantive area.

The program is organized around the student's research question which frames an intensive investigation of a particular question relevant to nursing. This starting point becomes the vehicle for the student to develop an advanced understanding of research methodologies and techniques and to gain knowledge which contributes to the theoretical development and practice of nursing.

Core classes, the doctoral seminar, and the thesis are all designed to prepare students who:

- Understand the philosophical and theoretical foundations of nursing science.
- Critically analyse their own and other's perspectives in relation to research and nursing practice.
- Demonstrate the requisite cognitive skills to develop health outcomes generally, or women's health outcomes specifically.
- Develop nursing practices that improve health outcomes generally, or women's health outcomes specifically.
- Influence health and social policy to improve health and health care systems.

The program consists of:

1. A minimum of four core classes:
   - NURS 6050, Contemporary Views of Nursing Science: Philosophy, Research, and Practice
   - two classes in the student's substantive area of study (one of which will be NURS 6200, Nursing Sensitive Health Outcomes, or NURS 6210, Women's Health Outcomes)
   - an advanced research methods/design course
2. NURS 6300, Doctoral Seminar
3. Comprehensive Examination
4. NURS 9530, Thesis

The PhD Comprehensive Examination in the student's area of study is normally taken in the second year, and not later than the beginning of the third year, of the program. Comprehensive examinations may be taken only after the completion of all required class work and they cannot be taken less than one year prior to the submission of the thesis for final defence. By the end of the student's first year of study, the Thesis Supervisory Committee will be identified. It is to be comprised of the Thesis Supervisor and a minimum of two additional faculty having membership in the Dalhousie University Faculty of Graduate Studies and expertise in the student's area of research interest. The Graduate Programs Committee and the Faculty of Graduate Studies will be notified of the Thesis Supervisory Committee membership. Members of the Thesis Supervisory Committee will set the student's Comprehensive Examination.

III. Immunization

Before undertaking clinical practica (NURS 54X5, NURS 54X6, NURS 5487, NURS 5620, NURS 5740), students must provide evidence of appropriate immunization and their immune status, as required by the clinical agency. This will include, but may not be restricted to: polio, diphtheria, tetanus, rubella, measles, mumps, and varicella. Evidence of tuberculin testing (Mantoux) is also required. Immunization against Hepatitis B is recommended.

IV. Class Descriptions

Note: Not all classes are offered every year. Please consult the current timetable for this year's offerings.

A. Master of Nursing Courses Phase I

Required Courses

NURS 5050.03: Philosophical and Methodological Issues Influencing Knowledge and Research.

This class explores the major philosophical and methodological underpinnings of science and knowledge. This exploration will inform a critical analysis of how nursing knowledge has evolved and will illuminate how the experience of nurses, along with the production of knowledge, meanings and values, can best be understood. Learners will develop an understanding of the assumptions underlying different research paradigms and the knowledge they generate by exploring issues such as: What is science? How has science evolved? What is knowledge? What is truth? What are the various research/science paradigms? How is knowledge translated into action?

NURS 5200.03: Health Care System Policy Analysis.

Health policy can be defined as "a set of interrelated decisions, taken by authorities, concerning the selection of goals and the means of achieving them" (as defined in A Code of Good Practice on Policy Dialogue). This seminar course examines critical issues and trends affecting health policy

in addition to the management practices of health care delivery services in Canada. Students engage in analytical debate while drawing on the assigned readings, other research, and their own clinical experience. Discussions incorporate historical and global perspectives as well as a range of influencing factors to understand, test, challenge, and contrast the effectiveness of current health policy and the related health care system in Canada.

NURS 5310.03: Social Organization of Nursing Knowledge.

This class examines the social organization of nursing knowledge by exploring a number of key social processes for their relevance and impact on nursing, both past and present. The goal is to identify and make explicit in the work of nurses processes of gender, professionalism, managerialism, technology and ethics to understand both change and constancy in the character of nursing work and knowledge. Students will apply their theoretical insights to an analysis of selected nursing work processes.

Advanced Theory/Practice I Classes (NURS 54X5 and NURS 5487)

These classes are an integration of the theories, research, and practice related to selected health-related concepts and issues in assessment and understanding of patterns of health and illness relevant to advanced practice across the specific clinical special area. This class includes 2-3 class hours and 6 clinical practice hours per week. Not all clinical foci will be offered every year, subject to faculty resources and student demand.

NURS 5435.03: Adult Nursing: Theory/Practice I.

In this seminar class, students will be challenged to think about and reflect on beliefs and values that inform nursing knowledge with a consideration of the comprehensive societal issues occurring in settings where the discipline of nursing is undertaken. While our focus is on the care of adults in the context of illness, the class will reflect a critical analysis of the existing theoretical and evidence-based perspectives influencing health and decision-making that span from the individual to the organization. In the student-professor negotiated clinical practicum component, students will examine how individuals/families/communities manage health related concerns throughout the health-illness continuum with the goal being improved quality of life. Students are challenged to think creatively and critically with regard to the design of their clinical experience.

NURS 5445.03: Community Nursing: Theory/Practice I.

This class is designed to analyze and integrate concepts, theories, research, and practice knowledge that is relevant in community assessment, understanding, planning, and advanced practice of community health nursing. The philosophy and principles of population health, primary health care, health promotion, and community development are foundational to the class and provide a broad framework for reflection and critical analysis of current issues, and trends in community health nursing.

NURS 5455.03: Mental Health Nursing: Theory/ Practice I.

This class assists students to enhance the development of advanced knowledge and competency regarding mental health and psychiatric nursing. Critical inquiry and clinical practice opportunities will be used to examine complex mental health phenomena, apply related theoretical concepts (with individuals, families, and/or groups), and strengthen students' skill base.

NURS 5465.03: Maternal-Child Nursing: Theory/ Practice I.

This class explores selected phenomena that are relevant to advanced nursing practice in child-bearing and women's health settings, and does so within a context of primary health care, the changing nature of the Canadian health care system, and a perspective of client as individual, family, and/or community. Students will explore literature in perinatal/ neonatal nursing and other disciplines to discover how the phenomena are manifested in human responses to health and illness, how the patterns of those responses have been and could be assessed, and identify implications for advanced nursing practice. As part of the class requirements, students will engage in clinical practica to focus on the assessment and understanding of patterns of development, health, and illness occurring within a child-bearing population of personal interest.

NURS 5475.03: Nursing Families of Ill Children: Theory/Practice I.

This class examines the theoretical and research bases on which the nurse acts in providing care for families with ill children. Physiological, psychosocial, cultural, and nursing concepts, theories, and research reports will be studied and applied to the understanding of the behavior and needs of the child and family when faced with illness and/or health care. Students engage in clinical practice with children and families and apply relevant theories, paradigms, and concepts in the plan of care.

NURS 5485.03: Principles and Theories for Nurse Practioner Practice.

This master's level course will introduce all nurse practictioner students to a general healthcare focus of populations across the lifespan and in multiple clinical settings. This course will consist of theories, terminology, point-of-care technology, assessment, diagnosis and treatment dirrected towards a poulation of all ages. Theories of family, change and adult learning will be presented to guide the nurse practitioner student in the development of a holistic plan of care for health promotion and disease prevention, health maintenance, health assessment, and acute and chronic disease management.
FORMAT: Seminar with practicum component
PREREQUISITE: NURS 5740

Advanced Theory/Practice II Classes (NURS 54X6 and NURS 5787)

These classes further integrate theories, research, and practice related to selected health-related concepts and issues in assessment and understanding of patterns of health and illness relevant to advanced practice across the specific clinical specialty area. The class includes 2-3 class hours and 6 clinical practice hours per week. Not all clinical foci will be offered every year. Subject to faculty resources and student demand.
PREREQUISITE: NURS54X5

NURS 5436.03: Adult Nursing: Theory/Practice II.

Building on NURS5435, students will be challenged to think about and reflect on beliefs and values that inform nursing knowledge with a consideration of the comprehensive societal issues occurring in settings where the discipline of nursing is undertaken. Students will share new knowledge resulting from the synthesis and transfer of evidence across disciplines and health care sectors and will examine how society is currently dealing with health related concerns throughout the entire health-illness continuum. Contextual issues within the broad social, economic, and cultural environments of nursing practice will be addressed through an analysis of competencies needed to support health system changes that value innovation and create new collaborative partnerships not previously fostered within traditional health care settings. The clinical practicum component builds on the work conducted in NURS5435. Students, as emerging nurse leaders, will engage in the implementation and evaluation of conceptual and/or theoretical frameworks being applied in their practice setting. Innovation and creative thinking will support the implementation process.

NURS 5446.03: Community Nursing: Theory/Practice II.

This class is designed to analyze and integrate concepts, theories, research, and practice knowledge that are relevant to the advanced practice of community health nursing. The philosophy and principles of public health, population health, primary health care, health promotion, and community development are foundational to the class and provide a broad framework for reflection and critical analysis of current issues and trends in community health nursing.

NURS 5456.03: Mental Health Nursing: Theory/ Practice II.

This class assists students to enhance the development of advanced knowledge and competency regarding mental health and psychiatric nursing. Critical inquiry and clinical practice opportunities will be used to examine complex mental health phenomena, apply related theoretical concepts (with individuals, families, and/or groups), and strengthen students' skill base.

NURS 5466.03: Maternal-Child Nursing: Theory/ Practice II.

This class builds on the knowledge, skills, and experiences of NURS 5465. Through critical inquiry and active communication and decision making, students will use scientific and empirical evidence to implement an advanced nursing practice role in a clinical childbearing setting within a primary health care context.

NURS 5476.03: Nursing Families with Ill Children: Theory/Practice II.

This class provides an opportunity for students to increase understanding of the child and family in high-risk and/or chronic health situations, to increase nursing proficiency through the development of theoretically- and empirically-based approaches to nursing care, and to provide leadership in working with staff and families to develop approaches to the problems encountered. The class requires students to implement advanced nursing approaches to biopsychosocial phenomena on individual and aggregate bases.

NURS 5486.03: Principles and Theories for Health and Disease Management in Adult Nurse Practitioner Practices.

This course will expand on the nurse practitioner student's knowledge, skills, and competency in health promotion, health maintenance, health assessment and management of disease in adults. The focus is the adult population (18+) who seeks healthcare services in multiple clinical settings. A strong emphases will be placed on health issues and common illnesses of adults with higher acuity levels and comorbidities, recognizing the acute and chronic nature of disease and targeting optimal health outcomes.
FORMAT: Seminar with practicum component
PREREQUISITE: NURS 5734.03, NURS 5740.03, NURS 5485.03

NURS 5487.03: Principles and Theories for Health and Disease Management in Families of All Ages Nurse Practitioner Practice.

This course is designed for nurse practitioner students who have chosen the Family All Ages focus for their future practice. Students will utilize a family focused approach in assessing clinical and research literature as a means of developing competence in health promotion, health maintenance and cultural sensitivity in caring for clients in the community setting. As well, evidence based practice in the management of illness across the life span will be one of the cornerstones of the course. Health issues and common illnesses which are frequently seen in primary health care settings will be discussed. Students will be expected to critically analyze the current literature in order to develop health care plans for clients from the prenatal period to the geriatric period of life. Utilizing the principles of primary health care as well as those of change theory and adult learning, students will develop expertise in how to work collaboratively with other health professionals as well as volunteers and community groups. Addressing health concerns by using diverse approaches including pharmacotherapeutics, health education and community development is an integral component of the course.
FORMAT: Seminar
PREREQUISITE: NURS 5434.03, NURS 5740.03, NURS 5485

B. Master of Nursing Courses Phase II

NURS 5610.03: Advanced Practice Role Development.

The focus of this course is the role of advanced practice nurses in health care. Emphasis will be on the examination and critique of the role components of the clinical nurse specialist, nurse practitioner and combined roles. These components include: direct care, consultation, coaching, research, collaboration, leadership/administration and ethical decision-making. Issues surrounding the implementation of these roles within various health care contexts and clinical specialties will be discussed.

NURS 5620.06: Advanced Practice Role Practicum.

This class provides the student with the opportunity to integrate, synthesize and analyze previously developed knowledge and skills in an intensive clinical practice experience directly related to the student's chosen client population/discipline in an advanced nursing practice role. The Individual Learning Plan developed in NURS 5740 is modified as needed and continues to guide student learning. Practice settings will offer experiences with clients experiencing acute and chronic illness states with multiple and complex care needs. These will be used to consolidate skill development related to the comprehensive management of clients' needs across the continuum of health. These include advanced skills related to health assessment, diagnostic testing and treatment planning with emphasis on systems thinking, developmental issues, and collaboration with clients, families and other health care professionals. The student will work closely with a clinical preceptor negotiated by the student and professor. While implementing the advanced practice role, students will consider the organizational, political, and health care policy-related issues that relate to advanced nursing practice and change in health care delivery that affect role development and implementation. Students in the Nurse Practitioner option will complete a minimum of 700 precepted clinical hours; these hours are distributed between NURS 5620, NURS 5740, NURS 5485, NURS 5486, and NURS 5487.
PREREQUISITE: NURS 54X6.03, or NURS 5487; NURS 5732.03; NURS 5734.03; NURS 5735.03; NURS 5740.03; NURS 5610.03 is a pre or co-requisite

NURS 5732.03: Pathophysiology for Advanced Nursing Practice.

This class uses an evidence-based conceptual approach to critically and comprehensively examine pathophysiologic phenomena relevant to advanced nursing practice. The phenomena examined are commonly encountered in acute and long-term illnesses, are alterations in function involving multiple body systems, are seen across the boundaries of age, disease entities, and clinical states, and are those for which nurses have a major role in assessing, monitoring, managing, and evaluating. Seminars are framed to systematically and critically examine the impact of these pathophysiologic phenomena on cell function, host defense responses, maintenance of vital functions, and neuro-endocrine-immune responses in individuals and groups across the lifespan.

NURS 5734.03: Principles of Pharmacotherapy for Nurse Practitioners.

This course focuses on core principles of pharmacotherapy relevant to all nurse practitioner practice. Pharmacotherapeutic problem solving approaches will be introduced and applied throughout the course. Effective and strategic use of drug and therapeutic information resources will be emphasized. Relevant issues to pharmacotherapeutic policy will be addressed. Principles of pharmacokinetics and pharmacodynamics will be introduced and integrated throughout therapeutic content areas. Legal and ethical responsibilities related to prescriptive authority and pharmacotherapeutic interventions will be addressed.

NURS 5735.03: Pharmacotherapeutics for Nurse Practitioners.

The course focuses on clinical applications of drug therapies relevant to nurse practitioner practice. Students will be given the opportunity to gain knowledge in order to integrate pharmacokinetic and pharmacodynamic concepts for a chosen client population/discipline in their clinical setting

and practicums. Students will gain therapeutic knowledge that includes the mechanism of actions, usual dosages, absorption, distribution, metabolism, elimination, and therapeutic use of medications. Principles of management for side effects and drug interactions of medications frequently encountered by nurse practitioners will be reviewed and applied. Additionally, students will be provided with the opportunity to identify and utilize timely and appropriate drug information resources that are applicable to their daily practice. Legal and ethical responsibilities related to pharmacotherapeutic interventions are addressed.
CROSS-LISTING: NURS 4094.03

NURS 5740.03: Advanced Health Assessment.

This class prepares students to perform advanced health assessments of young, middle-aged, and elderly adults who are healthy, as well as those who are experiencing illness. It will focus on the knowledge, skills, and processes required for advanced health assessment.
Students will develop competence in completing focused and comprehensive health assessments including history taking, physical examination, synthesis, critical analysis, diagnostic reasoning, clinical judgement, and interpretation of health data. Students will further develop their understanding of the pathophysiological basis of clinical findings and will integrate an increasing knowledge of pathophysiology and pharmacology as a basis for formulating a plan of care. Elements of an advanced health assessment include physical and mental health, psychosocial, family, cultural, and community factors, the determinants of health, and risk appraisal as they relate to a client's health status. Clinical, theoretical, and scientific knowledge will be synthesized in the identification and management of existing and potential states of health and illness. Approaches to effective written and verbal communication of advanced health assessments to lay and health professional colleagues will be addressed. It is expected that students will be competent in basic health assessment techniques prior to beginning the course. All students will develop an Individual Learning Plan [ILP] to guide their learning experience. Students will accumulate up to 200 hours precepted clinical experience while enrolled in NURS 5740. This experience is more concentrated in the latter half of the course, with approximately 15-20 hours/week required practicum hours. (Co- or Prerequisite: NURS 5732.03 & NURS 5735.03)
FORMAT: Weekly 2 hr seminar, 3 hr lab, 40 precepted clinical hrs/ semester

NURS 8000X/Y.06: Health Policy Practicum.

This practicum provides students with an opportunity to build knowledge and skills regarding health policy development, its application and/or evaluation. The practicum will focus on one particular policy relevant to the student's discipline/field of practice and will be tailored to individual student needs. The focus of the practicum can be generated from student work completed in other classes, or as a new topic of interest. The practicum is offered to any Master of Nursing student who elects the Policy option. Graduate students from other health-related disciplines are also eligible for this practicum subject to the availability of faculty expertise and resources.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

NURS 9000X/Y.06: Masters Thesis.

C. Master of Nursing Focused Electives

Thesis

NURS 5000.03: Intermediate Statistics.

This class is designed so that students will be able to select appropriate statistical methods to analyze categorical, ordinal and measurement data and to carry out the analysis on the computer using MINITAB and GLIM languages.
PREREQUISITE: MATH 1060.03
CROSS-LISTING: HESA 6500.03, HEED 5503.03, LEIS 5503.03, PHAR 5980.03, PHSE 5503.03, KINE 5503.03, STAT 5990.03

NURS 5100.03: Qualitative Research Methods.

In this qualitative research class, we will differentiate between method and methodology. The latter addresses all assumptions which guide research as a political process. Method refers to the ways in which data are collected, or the techniques for designing methods of analysis. Various methods which are qualitative in nature will be examined in detail in order to acquire an understanding of the differences in assumptions between traditional qualitative research and critical, action oriented, participatory, and feminist qualitative research.

NURS 5120.03: Quantitative Research Methods.

There is a basic structure and process to the development of a design for scientific inquiry. This class focuses on research methods in general and quantitative research methods in particular. These research methodologies are used in nursing science as they relate to the development and/or testing of theoretical formulations, design, critique, and writing of research proposals.

Policy Practicum

NURS 5893.03: Health Program Planning and Evaluation.

The focus of this course is on the theoretical and practical knowledge and abilities required for the cycle of health program planning and evaluation (HPPE) in contemporary health care. Students will build their own theoretical knowledge related to program planning approaches, evaluation models, theories and methods of data collection. Knowledge translation will be discussed, analyzed and critiqued including the contextual influences in program planning and evaluation such as ethics, politics, evaluator roles and stakeholder involvement. Prior knowledge of research methods will be beneficial.
FORMAT: Seminar

NURS 6000.03: Nursing Administration and Leadership.

This class focuses upon the changing role and expectations for health care manager and leaders within the Canadian health care system. Class topics such as organizational theories, the philosophy of primary health care, management theory and research based practice, and management challenges are covered through a variety of course activities including extensive readings, case studies, student presentations, field assignments, and papers.
CROSS-LISTING: HESA 6000.03

Consult department regarding other possible course selections.

D. Other Electives

NURS 5000.03: Intermediate Statistics
NURS 5100.03: Qualitative Research Methods
NURS 5120.03: Quantitative Research Methods
NURS 5330.03: Theoretical Concepts & Competencies Related to the Helping Relationship in Advanced Nursing Practice
NURS 5610.03: Advanced Practice Role Development
NURS 5732.03: Pathophysiology for Advanced Nursing Practice
NURS 5734.03: Principles of Pharmacotherapy for Nurse Practitioners
NURS 5735.03: Pharmacotherapeutics for Nurse Practitioners
NURS 5770.03: Mind and Body in Nursing Practice
NURS 5800X/Y.06/5810.03/5820.03: Reading Class
NURS 5830.03: Death and Dying/Palliative Care
NURS 5840.03: Human Resources in Health Care (cross-listed with HESA 6340.03)
NURS 5841.03: Management Union Relations in Health Care (cross-listed with HESA 6341.03)
NURS 5850.03: Women and Aging
NURS 5865.03: Quality Management (cross-listed with HESA 6365.03)
NURS 5871.03: Addictions Nursing Practice
NURS 5891.03: Health Informatics
NURS 5892.03: Specialty Practice of Oncology Nursing
NURS 5893.03: Health Program Planning & Evaluation

NURS 5894.03: Interprofessional Psychosocial Oncology: Introduction to Theory and Practice
NURS 5896.03: Working with Special Populations
NURS 5900X/Y.06/5910.03/5920.03: Reading Class
NURS 5950.03 A or B: Self-directed Learning in Nursing
NURS 5990.03: Interdisciplinary Human Nutrition
NURS 6000.03A: Nursing Administration and Leadership (cross-listed with HESA 6000.03)
NURS 6130.03: Measurement in Nursing Phenomena
NURS 6200.03: Nursing-Sensitive Health Outcomes
NURS 6210.03: Women's Health Outcomes

A minimum registration of three students is normally required for any class to be offered. Master of Nursing students may take NURS 6130.03, NURS 6200.03, NURS 6210.03 with the permission of the course professor and the Associate Director Graduate Programs.

E. PhD Courses

NURS 6050.03: Contemporary Views of Nursing Science: Philosophy, Research, and Practice.

This class explores the philosophy underlying the ontological, epistemological, and ethical approaches to nursing and its practices. Both learner and educator will critically analyze, reflect, and dialogue in a relational, scholarly, and intersubjective learning space. An in-depth understanding of the diverse research traditions that exist within the discipline of nursing and the unique body of knowledge that evolves within each tradition will be illuminated.
FORMAT: Seminar

NURS 6130.03: Measurement in Nursing Phenomena.

This class is designed to prepare learners to develop and share nursing knowledge in methodological and measurement issues as an evolving field in today's research environment. The preparedness of nursing science to embrace critical multiplism from the perspective of methodology, measurement, and evaluation will be interrogated.

NURS 6200.03: Nursing Sensitive Health Outcomes.

Conceptual, philosophical, theoretical, epistemological, methodological, and feasibility issues central to health outcomes research are examined. The concept of health outcomes and related health and social policies from the perspective of nursing practices are analysed and critiqued. The impacts of nursing practices on health outcomes at individual, family, community, and population levels will be discussed, analysed and critiqued.
FORMAT: Seminar

NURS 6210.03: Women's Health Outcomes.

The class provides a forum to analyse, discuss, and critique philosophical, conceptual, theoretical, methodological, and feasibility issues central to women's health outcomes research and nursing practice from a gender-based and diversity analyses perspective and the relationship to health and social policies. The short and long term impacts of nursing practices on women's health outcomes and nursing practice at the individual, family, community, and population levels will be analysed.
FORMAT: Seminar

NURS 6300X/Y.03: Doctoral Seminar.

The goal of the doctoral seminar is for students and faculty to share the findings from their research, engage in scholarly debate, and foster scholarship. The seminar will facilitate proposed and ongoing research between and among doctoral students, faculty members, and other key stakeholders. Focus is on the critical examination of the research process in nursing, health service delivery, and policy decision-making with an emphasis on maintaining the links between the research problem, theory, and research methods. Consideration is given to both quantitative and qualitative research approaches, designs, and data collection and analysis. Knowledge translation as a core component of research design will be discussed. Strategies for critically analyzing research studies and for utilizing findings are examined.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will only be given if both are completed consecutively.
FORMAT: Seminar

NURS 6800.03: Directed Doctoral Study.

This class offers doctoral students the opportunity to undertake further study in a specific topic of interest that is not covered by regular class offerings. The student will be supervised by a faculty member who is competent in the area of interest. Regular meetings between the student and the supervising faculty will be held. The method of evaluation will be contracted by the student and supervising faculty.

NURS 6820.03: Doctoral Reading Course.

This class offers doctoral students the opportunity to undertake further study in a specific topic of interest that is not covered by regular class offerings. The student will be supervised by a faculty member who is competent in the area of interest. Regular meetings between the student and the supervising faculty will be held. The method of evaluation will be contracted by the student and supervising faculty.
FORMAT: Independent study

NURS 9530.00: Doctoral Thesis.

PHDP 8000.00: Doctoral Comprehensive Requirement.

Following completion of class work, students will register in the Doctoral Comprehensive Requirement while they prepare for and continually until they have passed the Comprehensive Examination.

Occupational Therapy

Location: (Atlantic) School of Occupational Therapy
Forrest Building, Dalhousie University
Room 215, 5869 University Avenue
Halifax, NS B3H 3J5
Telephone: (902) 494-8804
Fax: (902) 494-1229
Email: occupational.therapy@dal.ca
Website: www.occupationaltherapy.dal.ca

Director

Townsend, E., DipP & OT, BSc (OT) (Toronto), MAdEd (St. FX), PhD (Dal)

MSc (Occupational Therapy) Graduate Coordinator

Merritt, B., BS (Psychology), MS(OT), PhD (Colorado State).

MSc (Occupational Therapy - Post-Professional) Graduate Coordinator

Versnel, J., BSc(OT) (Toronto), MSc(OT) (Western), PhD (Queen's)

Professor Emeritus

O'Shea, B., DipP & OT (Toronto), BSc (Queens), MS (Colorado State), LL.D. (Dal), Honorary PhD. Occupation as a determinant of health; curriculum design for professional studies; cross-cultural transfer of knowledge.

Professor

Townsend, E., DipP & OT, BSc (OT) (Toronto) MAdEd (St. FX), PhD (Dal). Educational and social foundations of occupation and occupational therapy: social organization of knowledge and systems; power and empowerment, client-centred practice, enablement.

Associate Professors

Beagan, B., BA, MA (Soc) (Dal), PhD (Soc) (UBC). Sociology of health and illness, health profession education, social inequality, research methodology.

Carswell, A., Dipl. (OT) (McGill), BSc (OT), MSc (McGill), PhD (Toronto). Occupational therapy outcome measures; dementia care; aging research; mindfulness and depression in older adults.

Doble, S., BSc (OT) (Western), MS (Boston), PhD (Dal). Measurement related to occupational function; care giving of seniors; occupational analysis of seniors.

Assistant Professors

Banks, S., BSc (Dal), MA (Dalhousie), Cert. Occ Ther. (Columbia). Educational outcomes; integration of academic and theoretical learning.

Brown, J., BSc (OT) (Toronto), MSc (OT-Post-Professional) (Dal). Primary Health Care, occupational therapy in mental health, recovery-oriented services and psychiatric rehabilitation, chronic disease management.

Grass, C., BSc (OT) (Western), MSc (Queen's), PhD Candidate (Queen's). Mental health care for criminal offenders with mental illness, policy implementation in dual prison-hospitals, understanding crime as occupation.

MacKenzie, D., BSc Physical Education (Saskatchewan), BSc (OT) (Alberta), MA(Ed) (MSVU). Neurological rehabilitation; spasticity management; health care education.

Merritt, B., BS (Psychology), MS (OT), PhD (Colorado State). Occupation-based assessment, occupational therapy theory, educational leadership, efficacy of occupation-based practice.

Saunders, J., BSc (OT) Dal, MBA (St Mary's). Private practice, professional leadership, continuing professional development.

Stadnyk, R., BA (Alberta), BSc OT (Queens), MSc (Queens), PhD (Toronto). Community practice; everyday lives of frail elderly persons and policies and services to support them.

Versnel, J., BSc (OT)(Toronto), MSc (OT) (Western). PhD (Queen's). Occupational development in children, adolescents and families, cognition and learning, and transitions from adolescence to adulthood.

Warner, G., Ph.D. (Epidemiology) (Case West Reserve University). Measurement and Evaluation, Health Services Research, Knowledge Transfer and Exchange, Health System Change to improve participatory outcomes

Lecturers

Landry, K., BSc(OT) (Dal), MSc(Rehabilitation Research - Physiotherapy) Candidate (Dal)

O'Keefe, C., BSc (OT) (Dal)

School Fieldwork Education Coordinator

Saunders, J., BSc (OT) (Dal), MBA (St. Mary's)

International Fieldwork Education Coordinator

Saunders, J., BSc (OT) (Dal), MBA (St Mary's)

Provincial Fieldwork Education Coordinators

New Brunswick: Roussel, M., DipHS (S-L Maillet), BSc, MA (Montreal)

Newfoundland: Head, B., BSc (OT) (Alberta), MSc (OT-Post - Professional) (Dal)

Nova Scotia: Saunders, J., BSc (OT) (Dal), MBA (St Mary's)

Prince Edward Island: Cutcliffe, H., Dip(OT) (Man)

Cross Appointments

Manuel, P., BA (Carleton), MSc (McGill), PhD (Dal)

Unruh, A., BSc (OT) (Western), MSW (Carleton), PhD (Dal)

Adjunct Professors

Basiletti, M., MSc (OT-Post-Professional) (Dal)

Bassett, B.R., B.A. Honours, M.A. (New Zealand), PhD (UBC)

Beaton, H., BSc (OT) (Dal)

Do Rozario, L., BOT (Queensland), DTS (Brisbane), MTP (California), PhD (Queensland)

Dubouloz, C.J., BSc en ergotherapie (Montreal), MSc en sciences cliniques (Montreal), PhD (UQAM)

Edem, D., BSc (OT) MHSA (Dal)

Egan, M., BSc (OT) (Western), MSc(OT) (Alberta), PhD (McGill)

Etcheverry, E., BSc (OT), PhD (Manitoba)

Fisher, A.G., BSc (OT) (Western Michigan), MSc, Sc.D.(Boston)

Forhan, E. MSc (OT-Post-Professional) (Dal)

Kirsh, B., BSc (OT), M.Ed., PhD (Toronto)

Law, M., BSc (OT) (Queens), MHS (McMaster), PhD (Waterloo)

MacNaughton, N., MSc (OT-Post-Professional) (Dal)

Mitcham, M., DipOT (Northampton), BSc(OT), MHE, PhD (Georgia)

Palmadottir, G., DipOT (Aarhus, Denmark), MSc(OT) (Colorado)

Pranger, T., BSc (OT), MEd , PhD (Toronto)

Taylor, S., M.A (Saint Mary's), PhD Cand (Univ of South Australia)

White, C., MSc (OT-Post-Professional) (Dal)

Whiteford, G., BSc (OT) (Curtin), MHS(OT), PhD (South Australia)

Wicks, A., BAS (OT) (Curtin), MHS (OT) (South Australia), PhD (Charles Sturt)

Wilcock, A., DipCOT (UK), Bapp ScOT (SAIT), Grad Dip Public Health, PhD (Adelaide)

I. Introduction

The Atlantic School of Occupational Therapy was established in 1982 as the only occupational therapy education program in Atlantic Canada. The School exists in response to strong regional advocacy, particularly since 1958 when a School was approved in principle by the University Senate. The regional orientation of the School fosters collaborative teaching, research and professional activities.

Occupational Therapy is a health profession concerned with enhancing the occupational performance, health and well-being of individuals, groups, and organizations particularly where inequities or injustice limit opportunities for meaningful participation in daily life occupations.

Occupation is viewed broadly to include everything we do to "occupy" ourselves in enjoying life, looking after ourselves and others, and contributing to the social and economic productivity of our communities.

Health is viewed broadly as having the ability, opportunity and resources, for quality life with meaningful occupations in supportive environments.

II. Degrees Offered

A. Master of Science (Occupational Therapy): Master's program to enter the profession

1. Full MSc (OT) Program: 13 credits, 78 credit hours full-time study
   a) Academic component: 58 credit hours over 22 consecutive months (6 semesters).
   b) Fieldwork component: 20 credit hours for a total of 1027.5 hours. Students may be assigned to fieldwork sites in any of the four Atlantic provinces. Normally, a student will complete no more than one fieldwork class in the Halifax/ Dartmouth area. Applicants who anticipate difficulty meeting fieldwork requirements are strongly encouraged to contact the School Fieldwork Education Coordinator to explore options early in their first academic term. National and International fieldwork options are available.
2. Single classes: with Entry Level Program Coordinator and Instructor permission, see Regulation 4.3.7.

B. Master of Science (Occupational Therapy–Post-Professional): Master's program for qualified occupational therapists

1. Full MSc (OT–Post-Professional) Program: 5 credits, 30 credit hours full- or part-time study on line
   a) Thesis option: Two required classes, two electives and a thesis
   b) Coursework option: Five required classes, three electives, and a practicum
2. Single classes: with Post Professional Program Coordinator and Instructor permission, see Regulation 4.3.7

C. Doctor of Philosophy, (PhD)

Faculty in the School of Occupational Therapy welcome applications for PhD studies focused on occupational therapy or occupational science. Interested persons are encouraged to contact individual faculty. Applications will be submitted either to the Faculty of Graduate Studies Interdisciplinary PhD program or the Faculty of Engineering Biomedical Engineering PhD program. Prospective students may be eligible for funding through scholarship programs at NSERC, SSHRC, CIHR, or from the Nova Scotia Health Research Foundation (NSHRF). Within Dalhousie funding possibilities include Killam scholarships.

III. Program Requirements

A. Master of Science (Occupational Therapy) - MSc (OT) to enter the profession

1. Introduction

- The MSc (OT) degree is the full-time study program, which opened in 2006 to enter the profession, replacing the BSc (OT) degree. Accredited by the Canadian Association of Occupational Therapists (CAOT) on behalf of the World Federation of Occupational Therapists, the program prepares graduates to write the CAOT national examination in July or November, which in turn provides eligibility for licensure by provincial, territorial and international regulatory bodies.

2. Admission Requirements

- A completed 4-year undergraduate degree with a minimum B average (73-76%) GPA in the last 2 years (or last 20 half credits) of a 4-year undergraduate degree.
- Two pre-requisite courses: equivalent to Dalhousie's Anatomy (ANAT) 1010.03 or 1020.03 and Physiology (PHYL) 2030.06.

Students seeking pre-requisite course equivalency information are referred to the Dalhousie Registrar's webpage https://dalonline.dal.ca/PROD/fyskeqiv.P_TransEquiv

- Students are recommended to ensure that their transcript and/or life experience includes a background in social sciences and statistics.
- Admission into the program is limited to 48 students. Admission is on a competitive basis with preference given to residents of the Atlantic Provinces. The provincial quota system currently allocates 35 of the 48 seats as follows: nine positions to New Brunswick, eight positions to Newfoundland and Labrador, 16 positions to Nova Scotia, and two positions to Prince Edward Island. Selection is based on completion of prerequisites, academic achievement and personal suitability for Occupational Therapy.
- Single Classes: with Entry Level Program Coordinator and Instructor permission (see Regulation 4.3.7). The admission category is Special Student-Graduate Studies (SSGS).

3. Application

All applicants must complete

- The Faculty of Graduate Studies Application for Admission Forms which are available at: www.dalgrad.dal.ca/admissions/ and,
- The School of Occupational Therapy's Supplementary Occupational Therapy Application form, available at: http://occupationaltherapy.dal.ca/Files/MScOT_Supplementary_Application_Form.pdf
- Affirmative Action: The School of Occupational Therapy is committed to the professional advancement of qualified occupational therapists who are persons with disabilities and/or who are members of the African Canadian or Aboriginal communities of the Atlantic region. Fully qualified applicants from these groups will be given preference in admissions. If you belong to one of these groups and wish to take advantage of this policy, you may voluntarily provide this information about yourself. Please note that students who request accommodations for a disability of any type are required to be registered with the Dalhousie Student Accessibility Services (SAS).

Application Deadlines

- March 15: Regular Admission Consideration. Deadline for submission of the Faculty of Graduate Studies Application for Admission Forms and the Supplementary Occupational Therapy Application Form to the School of Occupational Therapy. All final transcripts for courses that are still in progress must be received by June 1 of the admission year in order for the application to be considered by the Admissions Committee.
- January 15: Early Admission Consideration. Exceptional students who have completed ALL the admission requirements (i.e. no courses in progress) by December prior to the admission year may apply for early admission consideration.

4. Program Information

A. Immunization & CPR Requirements

Fieldwork education, the practical component of the educational program, takes place in a variety of occupational therapy practice sites where students may be exposed to or be carriers of communicable diseases which are vaccine preventable. Students must meet the immunization and other requirements established by the Faculty of Health Professions. Please refer to the following section on the FHP website: http://healthprofessions.dal.ca/Files/OccupationalHealthandInfecti.pdf before beginning their fieldwork component. For detailed information, see Forms, Policies and Handbooks at www.occupationaltherapy.dal.ca.

The School requires that students complete CPR (level C) training prior to their first fieldwork experience.

B. Transfer Credits

Transfer credits may be granted for classes in anatomy or pharmacology subject to the approval of the Course Instructor. Photocopies of calendar descriptions and course syllabi are required. Normally, no transfer credits are granted for OCCU classes.

C. Academic Dismissal

The School of Occupational Therapy will assume that a student has withdrawn from the program, and will accept another student in the seat, if the first student fails to attend orientation and the first week of classes without prior permission. In addition, a student who absents himself/herself from the School of Occupational Therapy without prior permission for an extended period (four weeks or greater) will be presumed to have withdrawn and will be required to re-apply for admission to the MSc (OT) program. See also Regulation 4.2.4

D. Fieldwork Costs

All students are responsible for paying travel and living costs associated with fieldwork classes.

E. Awards, Scholarships, Bursaries

Refer to occupationaltherapy.dal.ca for information regarding awards, scholarships, and bursaries for the entry-level MSc(OT) program.

F. Special Student - Graduate Studies (SSGS) (No-Degree, For Class Specific Admission)

Applications for access to single courses (maximum of 2 full credits-4 half credits) in the MSc (OT) program may be accepted with permission of the class instructor and appropriate graduate coordinator. Admission as an SSGS student is limited to occupational therapy students enrolled in other entry level programs or occupational therapists who are seeking refresher education or continuing professional development. Applicants for SSGS status in single MSc (OT) courses must meet program application and Faculty of Graduate Studies requirements as per 4.3.7. Prior Learning Assessment (PLA) for applicants who do not meet requirements may be considered on an individual basis. Applicants using prior learning assessment are responsible for the costs to prepare and review their material.

Required Classes for MSc (OT). Please refer to Dalhousie's online calendar for class descriptions and credit hours.

Year 1- 45 credit hours-7.5 credits 12 months September-August
Fall Term: Sept - Dec (On-Site) 3.0 credits, 18 credit hours
OCCU 5000.03 Theories of Occupation, Enabling and Justice (3 cr hr)
OCCU 5001.03 Enabling Occupation 1 (3 cr hr)
OCCU 5002.03 Health Conditions and Occupational Performance (3 cr hr)
OCCU 5003.03 Dimensions of Professional Practice (3 cr hr)
ANAT 5217.06 Functional Human Anatomy (6 cr hr)
Winter Term: Jan - mid-Apr (On-Site) 2.5 credits, 15 credit hours
OCCU 5004.03 Occupational Assessment and Occupational Analysis (3 cr hr)
OCCU 5005.04 Enabling Occupation 2 (4 cr hr)
OCCU 5006.03 Wellness and Inclusion by Design and Technology (3 cr hr)
OCCU 5111.02 Fieldwork I: 90 hours (2 cr hr)
OCCU 5043.03 Program Evaluation for Occupational Therapists (3 cr hr)
Spring Term: (flex delivery): May -August (Off-Site) 2.0 cr, 12 credit hours
OCCU 5222.06 Fieldwork II: 337.5 h (6 cr hr)
OCCU 5007.03 Research Approaches for Occupational Therapists (3 cr hr)
OCCU 5041.03 Evidence Based Occupational Therapy (3cr hr)

Year 2 - 33 credit hours - 5.5 credits 10 months September - June October Convocation
Fall Term: September-December (On-Site) 2.3 credits, 14 credit hours
OCCU 6001.05 Enabling Occupation 3 (5 cr hr)
OCCU 6140.06 Neuroscience for Occupational Therapy (6 cr hr
OCCU 6130.01 Pharmacology for Occupational Therapists (1 cr hr)
OCCU 6000.02 Applied Research 1 (2 cr hr)
Winter Term: January-April (Off-Site) 2.0 credits, 12 credit hour
OCCU 6111.06 Fieldwork III 300 hr (6 cr hr)
OCCU 6222.06 Fieldwork IV** 300 hr (6 cr hr)
Spring Term: May - June (On-Site) 1.2 credits, 7 credit hours
OCCU 6002.03 Social Influences on Occupational Performance (3 cr hr)
OCCU 6003.03 Advanced Practice Issues (3 cr hr)
OCCU 6600.01 Applied Research II (1 cr hr)

B. Master of Science (Occupational Therapy–Post-Professional)

1. Introduction

- The School of Occupational Therapy opened a post-professional Master of Science in occupational therapy program in 1998. Admitting qualified occupational therapists from national and international locales, this is an innovative, part-time or full time on-line distance education, five-credit Master's program with course work (non-thesis) or thesis options.

2. Admission Requirements MSc (OT–Post-Professional)

- Post-professional MSc program, full or part time
- Single classes: with Post-professional MSc Program Coordinator and Instructor permission (see Regulation 4.3.7). The admission category is Special Student-Graduate Studies (SSGS).

Students enrolled in OCCU 5020, Graduate Seminar and Practicum, must be eligible for licensure as an occupational therapist if practice is regulated in a student's chosen practicum location.

Master of Science (Occupational Therapy–Post-Professional)

Admission to the degree program is open to occupational therapists who have completed their occupational therapy education at a World Federation of Occupational Therapists (WFOT) approved educational program. Priority will be given to those who hold an entry level baccalaureate or master's degree in occupational therapy. Occupational therapists with a diploma who present strong evidence of experience or advanced study in theory and research will also be considered. Applicants must satisfy the general requirements for admission to the Faculty of Graduate Studies.

Priority will be given to occupational therapists who demonstrate the most favourable combination of academic excellence, leadership experience, referee recommendation, and knowledge of current trends in occupational therapy. Course work (non-thesis) or thesis research options are available.

3. Application

Documentation

All application materials are available online at www.registrar.dal.ca/. All applicants must submit:

- Faculty of Graduate Studies Application Form;
- If applicable, proof of English language competency;
- Letter of Intent;
- Curriculum Vitae;
- Two letters of Academic Reference;
- Two copies of official transcripts of all university classes;
- If applicable, request for specified classes of interest.

Admissions Deadlines

1. **MSc (OT– Post- Professional) Admissions for Canadian and Non-Canadian Applicants**
   Deadline: Feb 28th for May and September admission

Students admitted to the program may choose to initiate their studies in the Spring/Summer or Fall term. All new students are expected to complete their Program Orientation in August of that calendar year.

2. **Special Student-Graduate Studies (SSGS) applications**

Individuals applying to complete classes under SSGS status may apply for admission for the Fall, Winter, or Spring/Summer term.

Fall Term	August 1
Winter Term	November 15
Spring/Summer Term	April 1

4. MSc (Occupational Therapy—Post-Professional) Program

Post Professional Classes

- OCCU 5010.03: Advanced Studies on Enabling Occupation.
- OCCU 5020X/Y.06: Graduate Seminar and Practicum.
- OCCU 5030.03: Advanced Research Theory and Methods for Occupational Therapists.
- OCCU 5040.03: Identity and Transitions.
- OCCU 5041.03: Evidence-Based Occupational Therapy.
- OCCU 5042.03: Community Development for Occupational Therapists.
- OCCU 5043.03: Program Evaluation for Occupational Therapists.
- OCCU 5050.03: Public Dialogue on Occupations and Enablement.
- OCCU 5501.03/5502.03/5503.03/5504.03: Graduate Reading.
- OCCU 6501.03: Special Topics in Health, Health Care, and Social Services
- OCCU 6502.03: Special Topics: Advanced Data Analysis
- OCCU 9001.18: Thesis.

A. Coursework Option Description

Students registered in the coursework option complete a minimum of five full credits:

- OCCU 5010.03: Advanced Studies on Enabling Occupation
- OCCU 5030.03: Advanced Research Theory and Methods for Occupational Therapists
- OCCU 5050.03: Public Dialogue on Occupations and Enablement

Two of three practice area classes (examples listed):

- OCCU 5041.03: Evidence-based Practice
- OCCU 5042.03: Community Development for Occupational Therapists
- OCCU 5043.03: Program Evaluation for Occupational Therapists

A full credit practicum: The practicum component completed in a student's chosen location affords the student an opportunity to explore and develop theory on enabling occupation at a systems or organizational level.

Three elective classes.

Sample Plan for Full-Time Coursework Option Study
(Note: Student pays program fee for one academic year)

Fall Term	Winter Term	Spring Term
OCCU 5010	OCCU 5030	Elective
OCCU 5020	OCCU 5020	Elective
OCCU 5041	OCCU 5043	
OCCU 5042	OCCU 5050	

Sample Plan for Part-Time Coursework Option Study
(Note: Student pays program fee for nine academic terms)

	Fall Term	Winter Term	Spring Term
YEAR 1	OCCU 5010	OCCU 5030	Elective
YEAR 2	OCCU 5020	OCCU 5020	Elective
YEAR 3	OCCU 5041 OCCU 5042	OCCU 5050	Elective

B. Thesis Option Description

Students registered in the thesis option complete a minimum of five full credits including OCCU 5010 - Advanced Studies on Enabling Occupation (0.5 credits), OCCU 5030 - Advanced Research Theory and Methods for Occupational Therapists (0.5 credits), two elective classes (each 0.5 credits), and a thesis (3.0 credits). Thesis students must complete OCCU 5010 and OCCU 5030 before defending their thesis proposal.

Sample Plan for Full-Time Thesis Option Study
(Note: Student pays program fee for one academic year; thesis only fees thereafter)

Fall term	Winter Term	Spring Term
OCCU 5010	OCCU 5030	OCCU 9001
Elective	Elective	
OCCU 9001	OCCU 9001	

Sample Plan for Part-Time Thesis Option Study (3 Years)
(Note: Student pays program fee over nine academic terms "Thesis Only" fees thereafter)

	Fall Term	Winter Term	Spring Term
YEAR 1	OCCU 5010	OCCU 5030	Elective
YEAR 2	Elective	OCCU 9001	OCCU 9001
YEAR 3	OCCU 9001	OCCU 9001	OCCU 9001

5. Program Information

A. Residency, Orientation, Additional Classes, Advisors (Degree students, not single course students)

All full-time and part-time MSc (OT–Post-Professional) students are **required** to attend and participate in an on-site residency period of up to two weeks in August. The schedule includes an orientation to the program, library and technology. Each student is assigned a Faculty Advisor upon their admission to the program.

Students wishing to spend more time on campus at any time throughout their program are welcome to make their own arrangements to use library and other university and School facilities. Students determine their own schedule in consultations with their Faculty Advisor and subject to class scheduling. Faculty Advisors may or may not become the student's Thesis Supervisor.

Negotiations between a student and Thesis Supervisor may result in a student being required to complete an additional half (0.5) class credit in research methods or elective classes, as available and accessible with appropriate permission.

Full-Time and Part-Time Study

The MSc (OT–Post-Professional) program is available to students on a full time or part time basis. Full-time students may enrol in up to five full or ten half credits per year. Part-time students may enrol in up to two and one-half credits in any one academic year. Students are advised to enrol first in OCCU 5010.03: Advanced Studies on Enabling Occupation. The normal upper time limits are four years for full time and five years for part time study. Extensions may be granted in special cases upon petition to the Faculty of Graduate Studies

Distance Costs

Students pay a Distance Fee per class on application to cover mailings, limited long distance phone costs, administration, and related expenses. Additional student expenses include: textbooks, long distance telephone and fax costs, photocopy costs for library materials during orientation, access to the Internet and other technology or software, travel and accommodations for the on-site orientation. Depending on a student's thesis research, statistical or qualitative analysis software and bibliographic software are recommended.

B. Transfer Credits

Occupational therapists with partial graduate level education in another field or at another university may submit a request to transfer credits to this program if the credits have not been used toward another degree. A maximum of one full credit (two .5 classes) with a grade of B- or above may be transferred, on individual review of transcripts and full class descriptions by the Post Professional Program Coordinator. All transfers are subject to approval by the Faculty of Graduate Studies. Dalhousie MSc(OT) graduates may apply for transfer credit for 1.0 credit given that OCCU 5041 and OCCU 5043 are common to the MSc(OT) and MSc(OT-Post - Professional) degrees.

C. Dalhousie Letters of Permission

Students may complete up to 1.0 full credit (two .5 elective classes) of the MSc (OT–Post-Professional) program outside Dalhousie under Letters of Permission from the Graduate Program Coordinator. Requests, including a detailed course outline, must be submitted prior to the student enrolling in the class.A grade of B- or higher is required for these classes to be credited towards the student's MSc (OT–Post-Professional). Enrollment at Dalhousie enables students to complete classes by Letter of Permission at Canadian Atlantic universities without additional fees. Additional fees are normally required by other universities.

Please note the total of 1.0 full credit includes classes completed as SSGS transfer credits and classes completed by Letter of Permission.

D. Awards, Scholarships, Bursaries

Refer to www.dalgrad.dal.ca/funding for information regarding awards, scholarships and bursaries for the MSc (OT–Post-Professional) program

E. Special Student - Graduate Studies (SSGS) (No-Degree, For Class Specific Admission)

Occupational therapists who meet Faculty of Graduate Studies criteria, and who have permission of the School Post Professional Program Coordinator may enroll in a maximum of one full credit (two .5 classes) offered within the MSc (OT– Post-Professional) program.

Normally, classes completed under SSGS status cannot be used for credits towards formal graduate programs. However, occupational therapists who complete classes under SSGS status can at the time of their application to the MSc (OT– Post-Professional) program, apply to receive credit for up to two SSGS classes (6 credits total). Final approval must be granted by the Post Professional Program Coordinator and the Faculty of Graduate Studies. (see Regulation 4.3.7)
NOTE: The fees paid as an SSGS do not count towards the program fee paid by a student admitted to the MSc (OT– Post-Professional) program.

IV. Class Descriptions

See classes required to complete MSc (OT) and MSc (OT–Post-Professional) degrees

OCCU 5000.03: Theories of Occupation, Enabling & Justice.

This class explores and analyzes the theories, practice models and frames of reference that are foundational to the occupational therapist's view of occupation, occupational performance, enabling occupation, and occupational justice. Consistent with the School's educational philosophy of experiential learning, the class format will include discussions, scenarios, role play, presentations, labs, and assignments. Students are expected to engage in critical and reflective analysis, and in creative problem solving in the classroom, laboratory, fieldwork experiences, and in assignments.
TECHNOLOGY: Consult http://www.dal.ca/ilo for current technology requirements
INSTRUCTOR(S): B. Merritt
FORMAT: On site, mixed methods, BLS
PREREQUISITE: Eligibility for admission to the MSc (OT) program.

OCCU 5001.03: Enabling Occupation 1.

This course introduces the student to the occupational therapy process of practice used to enable individuals who are experiencing changes in their occupational performance abilities due to psychosocial and environmental factors. Practice skills will focus on engaging the client's strengths, developing psychosocial capacity and environmental modifications to enable occupational performance.
TECHNOLOGY: Consult http://www.dal.ca/ilo for current technology requirements
INSTRUCTOR(S): C. Grass
FORMAT: On site, mixed methods, BLS
PREREQUISITE: Eligibility for admission to the MSc (OT) program

OCCU 5002.03: Health Conditions and Occupational Performance.

This class examines the relationship between medically-defined health conditions and occupational performance across the lifespan. Students will learn to describe health conditions and analyze their impact on the performance of occupations in daily life as well as the impact of occupational performance on health conditions. The knowledge base developed will be in the aetiology, medical classification and diagnosis, symptoms, treatment and prognosis of common mental and physical conditions that affect the performance of daily occupations. Knowledge about conditions drawn from various medical specialties will be synthesized with occupation specific knowledge. Multiple learning methods will include lectures, small group tutorials, self-directed inquiry, and critical analysis of the cultural construction of health conditions.
TECHNOLOGY: Consult http://www.dal.ca/ilo for current technology requirements
INSTRUCTOR(S): J. Saunders
FORMAT: On site, mixed methods, BLS
PREREQUISITE: Eligibility for admission to the admission to the MSc (OT) program

OCCU 5003.03: Dimensions of Professional Practice.

This class is designed to prepare students for professional practice. Emphasis is placed on the importance of professional behaviors, ethical and legal issues that arise in the health care context, and professional reasoning required to begin professional practice in fieldwork experiences. Through a variety of experiences and with a professional perspective, students will expand their current knowledge about occupation, and integrate theory and knowledge from co-requisite and prerequisite to issues that are representative of current occupational therapy practice.
TECHNOLOGY: Consult http://www.dal.ca/ilo for current technology requirements
INSTRUCTOR(S): J. Brown
FORMAT: On site, mixed methods, BLS
PREREQUISITE: Eligibility for admission to the MSC (OT) program

OCCU 5004.03: Occupational Assessment and Occupational Analysis.

Students will explore fundamental concepts, processes and strategies to assess and analyze a client's occupational interests, needs and goals. In assessing individuals and groups, students will analyze physical, cognitive, and affective capacities and skills utilized when engaged in occupations. In assessing occupations, students will analyze how to select, grade and adapt occupations to meet client defined occupational goals. In assessing social, physical, institutional and cultural environments, students will analyze environmental influences in order to understand and adapt the environment to meet occupational goals, and the health of individuals, communities and organizations. Students will critically review how different assessment methods are employed to elicit a comprehensive understanding of the occupational needs of individual clients, groups, agencies or communities.
TECHNOLOGY: Consult http://www.dal.ca/ilo for current technology requirements
INSTRUCTOR(S): A. Carswell
FORMAT: On site, mixed methods, BLS
PREREQUISITE: Eligibility for admission to the MSc (OT) program

OCCU 5005.04: Enabling Occupation 2.

This class builds on the knowledge and skills acquired in Enabling Occupation I. The course will examine how environmental factors influence individual, group or population's ability to participate in everyday activities. Students will be expected to analyze and develop intervention skills to enhance the individual's ability to participate and/or to adapt the environment to enhance occupational performance.
TECHNOLOGY: Consult http://www.dal.ca/ilo for current technology requirements
INSTRUCTOR(S): A. Carswell
FORMAT: On site, mixed methods, BLS
PREREQUISITE: Eligibility for admission to the MSc(OT) program

OCCU 5006.03: Wellness and Inclusion by Design and Technology.

In this course students learn the principles and best-practice application of design and technology to enable occupational well-being, participation and inclusion in the public and personal sectors. Through practical projects in environmental design and application in laboratory sessions, students develop skills in evaluating, designing and promoting the reachability, usability and accessibility of the built environment which has a profound effect on the choice and opportunities we have in engaging in meaningful occupations in everyday life.
TECHNOLOGY: Consult http://www.dal.ca/ilo for current technology requirements
INSTRUCTOR(S): K. Landry
FORMAT: On site, mixed methods, BLS
PREREQUISITE: Eligibility for admission to the MSc(OT) program

OCCU 5007.03: Research Approaches for Occupational Therapists.

This class introduces theories and epistemologies underlying positivist and naturalist (quantitative and qualitative) approaches to research, particularly focusing on the issues that arise for research on occupation and in occupational therapy. We explore tensions between objectivity and subjectivity, the value of standardized measures, insider/ outsider issues unique to clinician-researchers, concerns about inclusion/ exclusion, ethical issues in research, and particularly power concerns inherent in research. We examine the epistemological and methodological 'fit' of various research approaches with occupational therapy, asking how research may best move the profession forward. The focus in this course is on critical appraisal of the social, political, economic, and ethical matters that shape the research enterprise. The aim is to develop astute consumers and critics of scholarly research.
TECHNOLOGY: Consult http://www.dal.ca/ilo for current technology requirements
INSTRUCTOR(S): TBA
FORMAT: On site, mixed methods, BLS
PREREQUISITE: Eligibility for admission to the MSc (OT) program

OCCU 5010.03: Advanced Studies on Enabling Occupation.

This 13 week class will facilitate advanced critique on research and theories on occupation, and on processes on enabling change in individuals, environments and systems. Drawing on empirical, interpretive, and critical social sciences, students will explore the key issues and literature relating to occupation and occupational therapy, particularly focusing on the three areas of concentration for the post-professional MSc program: Foundations, Evaluation, and Systems Organization.
TECHNOLOGY: Consult http://www.dal.ca/ilo for current technology requirements.
INSTRUCTOR(S): R. Stadnyk
FORMAT: Distance, on-line, BLS
PREREQUISITE: Qualified Occupational Therapists by permission of the instructor

OCCU 5020X/Y.06: Graduate Seminar and Practicum.

This 26-week seminar and practicum class is designed to enable students to identify and assume new roles as occupational therapists. This course is based on our understanding that individuals' occupational engagement can be supported or constrained by the environments in which they live, work and play. Environments are largely constructed by the services, systems, and policies that humans establish. In this course, students will partner with organizational clients to enable them to more effectively meet the occupational needs of their clients, consumers and/or members. Students are provided with the opportunity to develop their abilities to assume the role of consultant. Using the Canadian Practice Process Framework to guide their interactions with their organizational clients, students will explore and identify how to use theory while enabling occupation. Students are responsible for identifying and negotiating agreements with organizational clients. The course coordinator must approve each student's proposed practicum project. Students are provided with regular opportunities to receive feedback, guidance, and support from the course coordinator and classmates through journaling assignments.
TECHNOLOGY & SOFTWARE: Consult http://www.dal.ca/ilo for current technology requirements.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): S. Doble
FORMAT: Distance, on-line, BLS
PREREQUISITE: MSc (OT-Post-Professional)students only

OCCU 5030.03: Advanced Research Theory and Methods for Occupational Therapists.

This 13-week web-based distance-education class gives a comprehensive introduction to theory and epistemology underlying qualitative and quantitative research methods distinguishing between naturalistic and experimental approaches. It then focuses on the development and application of theoretical approaches to research. Goals of the class are to develop facility in designing and pursuing research projects, encouraging students to become critical, independent researchers. In addition to completing research assignments relating to both qualitative and quantitative methods and analysis, students will prepare a proposal which may serve as a first draft of their thesis proposal, giving particular attention to epistemology, methodology, and ethical considerations. Students are encouraged in this class to develop a facility with quantitative and qualitative methods and statistics packages that will benefit their thesis research or interests in evidence-based practice.
TECHNOLOGY & SOFTWARE: Consult http://www.dal.ca/ilo for current technology requirements. Other software may be required at the discretion of the instructor.
INSTRUCTOR(S): G. Warner
FORMAT: Distance, on-line, BLS
PREREQUISITE: Qualified occupational therapists; other graduate and SSGS students by permission of the instructor

OCCU 5040.03: Identity and Transitions.

People craft identities from what they do and within the social relations of which they are part, and these identities shift and change as people move through their lives and experience their worlds and find new ways to present themselves. This internet-based class explores discourses and narratives of identity construction with particular focus on gender, culture, occupation and meaning, and on transitions both physical or social.
TECHNOLOGY & SOFTWARE: Consult http://www.dal.ca/ilo for current technology requirements.
FORMAT: Distance, on-line, BLS
PREREQUISITE: Open to graduate students in any field.

OCCU 5041.03: Evidence-Based Occupational Therapy.

This class provides students with the opportunity to examine and critique evidence-based practice and its application to occupational therapy. Using readings, online exercises, and discussion, students analyze the principles underlying evidence-based practice, learn methods to critically appraise the literature, and integrate these methods into occupational therapy practice. This course has 2 sections, one in each of the masters programs using different teaching formats. Please check with the School before enrolling to ensure you are in the appropriate section.
TECHNOLOGY & SOFTWARE: Consult http://www.dal.ca/ilo for current technology requirements.
INSTRUCTOR(S): J. Versnel
FORMAT: Onsite and distance, BLS
PREREQUISITE: Qualified occupational therapists; other graduate and SSGS students by permission of the instructor

OCCU 5042.03: Community Development for Occupational Therapists.

This class explores community development as a distinctive domain of practice for occupational therapists. A wellness and community development approach in enabling and facilitating systemic and community building is offered within the contexts of primary health care, health promotion and community development philosophy and in particular, the Ottawa and Jakarta Declaration of Health Promotion as guides for reflective practice. Practical and professional integrated skills and knowledge are developed.
TECHNOLOGY & SOFTWARE: Consult http://www.dal.ca/ilo for current technology requirements.
INSTRUCTOR(S): L. do Rozario
FORMAT: Distance, on-line, BLS
PREREQUISITE: Qualified occupational therapists; other graduate and SSGS students by permission of the instructor

OCCU 5043.03: Program Evaluation for Occupational Therapists.

This class covers the key issues involved in undertaking program planning and evaluation. This is a knowledge and skill development course that covers such topics as: the purpose and rationale for evaluation; models of evaluation with an emphasis on collaborative (client-centred) approaches; types (Evaluability assessment, process & outcome, summative & formative); stages and ethical issues.
This course has 2 sections, one in each of the masters programs using different teaching formats. Please check with the school before enrolling to ensure that you are in the appropriate section.
TECHNOLOGY & SOFTWARE: Consult http://www.dal.ca/ilo for current technology requirements.
INSTRUCTOR(S): J. Brown (Post Professional)/and (MScOT)
FORMAT: Distance, on-line, BLS
PREREQUISITE: Qualified occupational therapists; other graduate and SSGS students by permission of the instructor

OCCU 5050.03: Public Dialogue on Occupations and Enablement.

This is a 'capstone' class, and constitutes the major paper requirement of the distance education, coursework post-professional MSc program. Students develop a public presentation and publishable manuscript to stimulate public dialogue on occupations and enablement.
TECHNOLOGY & SOFTWARE: Consult http://www.dal.ca/ilo for current technology requirements.
INSTRUCTOR(S): R. Stadnyk
FORMAT: Distance, on-line, BLS
PREREQUISITE: OCCU 5010.03, Qualified Occupational Therapists and permission by instructor

OCCU 5111.02: Fieldwork I (90 hr) (January – April).

Students gain first hand experience of the personal and social forces that influence occupational development, participation and engagement of individuals and groups in the Halifax Regional Municipality. Weekly learning activities from the School and student generated learning objectives provide a structure for developing core professional skills of observation, occupational assessment and occupational analysis, enabling approaches, professional conduct, communication and professional reasoning. Students take responsibility for their own learning consistent with the School's educational philosophy of experiential learning. Students perform learning activities in different community organizations in conjunction with on site supervision, peer support, and group tutorials with licensed occupational therapists. Tutorials guide students in critical reflection on the relationships between their fieldwork experience, academic learning, personal background and prior assumptions.
TECHNOLOGY: Consult http://www.dal.ca/ilo for current technology requirements
INSTRUCTOR(S): TBA
FORMAT: On site, mixed methods, BLS
PREREQUISITE: Eligibility for admission to the MSc (OT) program

ANAT 5217.06: Functional Human Anatomy.

Graduate students entering the MSc(OT) program will cover a full-credit (6 credit hours) of gross and neuroanatomy and histology of the human body through the use of lectures, anatomical specimens and demonstrations. The focus is on functional anatomy and neurological control of the head, limbs and back and on the organization of sensory and motor systems. Laboratory study includes osteology, living (surface) anatomy and learning from anatomical specimens about musculo-skeletal, innervation and vasculature anatomy used in the performance of daily life. Emphasis is on critical thinking, and the self-directed use of web-based, video, and other modular resources.
INSTRUCTOR(S): Currie, R. W.
FORMAT: Lecture, seminar, discussion, lab, term paper, etc.
PREREQUISITE: ANAT 1010 or equivalent

OCCU 5222.06: Fieldwork II (337.5 hr) (May – June).

Students focus on the broad scope of occupational therapy practice in mental and physical health practice settings and in rural and remote locations. Students develop a clear professional identity and learn to describe and justify their professional reasoning through the full process of occupational therapy practice. Occupational therapist preceptors provide supervision, direct, concrete feedback and frequent coaching sessions.
TECHNOLOGY: Access to internet and e-mail is strongly recommended during fieldwork courses.
INSTRUCTOR(S): J. Saunders
FORMAT: nine weeks of full-time fieldwork learning in Atlantic Canada following orientation in the academic setting
PREREQUISITE: Successful completion of MSc (OT) Year 1 courses, including OCCU 5111 Fieldwork I; or by permission of the instructor.

OCCU 5501.03/5502.03/5503.03/5504.03: Graduate Reading.

In a reading class, the student works with a full-time, part-time, or an Adjunct faculty of Dalhousie's School of Occupational Therapy, who is also a member of the Faculty of Graduate Studies. The student and faculty member submit a discussion schedule and planned assignments and grading criteria for approval by the School's Graduate Program Committee. Available in all four terms (Fall, Winter, Spring, and Summer), the goal is for an individual graduate student to design, critique, debate, and complete a program of reading on a selected topic or area.
FORMAT: e-mail, posted mail, audioconference, videoconference, web-based learning, as selected by student and instructor.

OCCU 6000.02: Applied Research I.

This is the first part of the major project course for the entry-level Master of Science (occupational Therapy) program. The students choose from a list of possible scholarly projects related to occupational science, occupational therapy, and/or related fields. Together with a faculty member, student teams will negotiate the project to be undertaken, develop a theoretical rational for thr project, conduct an in-depth literature review, design and/or defend the methodology and conduct the project.
FORMAT: BLS, Seminars, Team meetings with faculty member and group seminars.
PREREQUISITE: OCCU 5007.03 Research Approaches for Occupational Therapists, OCCU 5043.03 Program Evaluation for Occupational Therapists and Admission to the MSc (OT) program; or special student status with permission of instructor and the Faculty of Graduate Studies.

OCCU 6001.05: Enabling Occupation 3.

This course will build upon the practice knowledge and skills developed in enabling 2 by introducing the student to the neurological and cognitive aspects of occupational performance across the lifespan. Focus will be on the occupational therapy process of pactice with clients experiencing complex occupational performance issues.
INSTRUCTOR(S): D. Mackenzie
FORMAT: Lecture & Lab
PREREQUISITE: Completion of Year 1 of the MSc (OT) program, or by permission of the instructor

OCCU 6002.03: Social Influences on Occupational Performance.

This course explores the ways occupational meaning, engagement and performance are shaped by 'social location' - the experiences, values, assumptions, expectations that arise out of such factors as our race, class, gender, sexual orientation, culture, age, ability/disability. We explore how these factors affect therapy and occupation for both clients and therapists.
INSTRUCTOR(S): B. Beagan
FORMAT: Seminar
PREREQUISITE: Successful completion of year 1 and year 2, Fall and Winter terms, MSc (OT); or by permission of the instructor.

OCCU 6003.03: Advanced Practice Issues.

This class builds skills in critical analysis, evidence-based professional reasoning, presentation, and synthesizing previous knowledge into current practice. Using current issues in health and occupational therapy practice, the required exercise of reflecting, reasoning, determing, a personal perspective and developing a plan of action strengthens current and life-long learning patterns.
INSTRUCTOR(S): C. Grass
FORMAT: lectures, Lab, Discussion
PREREQUISITE: Successful completion of year 1 MSc(OT) courses and year 2, fall and Winter terms; or by permission of the instructor.

OCCU 6111.06: Fieldwork III.

Students focus on developing competence and confidence in integrating theory, research, enabling principles and principles of evidence based practice through the full process of practice with clients experiencing complex occupational performance issues across the life span, and with groups and organizations. Students practice in a safe manner and begin to make a meaningful contribution as a team member. Occupational therapist preceptors provide periodic or occasional coaching.
TECHNOLOGY: Access to internet and e-mail is strongly recommended during fieldwork courses
INSTRUCTOR(S): J. Saunders
FORMAT: eight weeks of full-time fieldwork learning in Canada or internationally following orientation in the academic setting.
PREREQUISITE: Successful completion of MSc(OT) Year 1 and Year 2 Fall term courses, or by permission of the Instructor.

OCCU 6130.01: Pharmacology for Occupational Therapists.

The course provides students with relevant and comprehensive information on how contemporary drug therapies, including some alternative natural/herbal remidies, can affect patients receiving occupational therapy. It introduces basic pharmacological principles and includes information on drug delivery, pharmacokinetics and metabolism. Students learn to use commonly available resources to investigate drugs.
INSTRUCTOR(S): K. B. S. Pasumarthi
FORMAT: Lecture
PREREQUISITE: Inroductory Physiology (Physiology 2030 or its equivalent), Functional Human Anatomt (ANAT 5217.06) or permission from course instructors.
COREQUISITE: Enabling 3 (OCCU 6001.05), Neuroscience for Occupational Therapy (OCCU 6140.03), Applied Research I (OCCU 6000.02), or permission from course instructors

OCCU 6140.06: Neuroscience for Occupational Therapy.

This course provide students with the foundational nuerosience knowledge and application of human neuroanatomy and neurophysiology concepts for occupational therapy practice. Emphasis will be placed on functional neuroscience of brain systems experiencing common neurological challenges, and involves work in microanatomy, gross anatomy, and neurophysiology of the brain and spinal cord.
INSTRUCTOR(S): D. Mackenzie, Ron A. Leslie, D. Rasmussen
FORMAT: Lecture, Lab, Seminar
PREREQUISITE: Introductory physiology (physiology 2030 or its equivalent), Functional Human Anatomy (OCCU 5217.06) and successful completion of year 1 program; or permission from course instructors.

OCCU 6222.06: Fieldwork IV.

Students focus on consolidating and refining core competencies, reflecting on practice, and seeking new challenges, while integrating theory, research, enabling principles and principles of evidence based practice through the full process of practice. Students become independent in working with individual, group and organizational clients and demonstrate clinical confidence and consistency in making sound professional decisions and judgments in preparation for entering professional practice. Occupational therapist preceptors provide minimal guidance and coaching.
TECHNOLOGY: Access to internet and e-mail is strongly recommended during fieldwork courses
INSTRUCTOR(S): J. Saunders
FORMAT: Eight weeks of full-time fieldwork learning in Canada or internationally following orientation in the academic setting.
PREREQUISITE: Successful completion of MSc (OT) Year 1 courses, Year 2 Fall term courses and OCCU 6111; or by permission of the Instructor.

OCCU 6501.03: Special Topics in health, healthcare, and social services.

This seminar consists of an intensive examination of a selected substantive issue of concern broadly in health, well-being, health care and social services. In particular attention will be given to practice, policy, economic and/or sociocultural issues that arise in diverse contexts. The class will encourage interdisciplinary and interprofessional perspectives. Since the specific topic or issue which receives special treatment will differ from year to year, students are advised to consult the School prior to registration.
FORMAT: Seminar

OCCU 6502.03: Special Topics: Advance Data Analysis.

This is an advanced graduate course in the theory, techniques and issues of qualitative data analysis. The course is aimed at graduate students who have completed a qualitative course or a course with a qualitative component, and who are at a stage in their graduate career to begin data analysis. Data with which to work in the course is required prior to beginning the course. The course is intended to give students an orientation to a number of methods of data analysis, in addition to a critical and reflexive understanding of the issues related to various methodologies and their techniques of analysis.
TECHNOLOGY: Consult http://www.dal.ca/ilo for current technology requirements
FORMAT: Distance, on-line, BLS

OCCU 6600.01: Applied Research II.

This is the second part of the major project course for the entry-level Master of Science (Occupational Therapy) program. The students have completed a scholarly project related to occupational science, occupational therapy, and/or related fields supervised by a faculty member. Together with the faculty member, the students will complete a report and disseminate the outcome of the project with their team to a relevant audience.

FORMAT: BLS, Seminars, Team meetings with faculty member and group seminars

PREREQUISITE: OCCU 6000.02

OCCU 9001.18: Thesis.

The thesis requires original research at the master's level. Basic or applied research using qualitative or quantitative methodologies will be conducted as appropriate. Thesis supervision by distance will involve email, telephone, post, teleconference or other communication as appropriate.

RESTRICTION: MSc (OT-Post-Professional) Thesis stream students

Oceanography

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Chair of Department

Boudreau, P.

Graduate Studies Coordinator

Kelley, D.

Professors Emeriti

Bowen, A.J., MA (Cantab), PhD (Scripps), FRSC. Physical oceanography, nearshore dynamics, sediment transport.

Fournier, R.O., MSc (Wm. & Mary), PhD (URI). Biological oceanography

Mills, E.L., BSc (Carl.), MS, PhD (Yale), FLS. Benthic ecology, history of oceanography

Professors

Beaumont, C., BSc (Sussex), PhD (Dal), Canada Research Chair. Geodynamics

Bentzen, P., BSc (McGill), MSc (UBC), PhD (McGill) (cross appointment with Biology), DFO Chair Fisheries Resource Conservation Genetics.

Boudreau, B.P.,BSc (UNB), MS (Texas A & M), MPhil, PhD (Yale). Diagenesis, sediment-water exchange, modelling

Cullen, J., AB (Calif, Santa Cruz), PhD (Scripps) (NSERC/Satlantic Research Chair, Killam Chair in Ocean Studies) Phytoplankton processes, optical measurements, effects of ultraviolet radiation

Grant, J., BSc (Duke), PhD (South Carolina). Benthic ecology, shellfisheries

Greatbatch, R.J., BSc (Liverpool), PhD (Cambridge) (NSERC/MARTEC/AES Research Chair). Ocean atmosphere dynamics.

Hay, A., BSc, MSc (Western), PhD (UBC). Physical oceanography, ocean acoustics

Hill, P.S., AB (Dartmouth), MSc, PhD (Wash). Fine sediment transport, particle aggregation.

Lewis, M.R., BS, MS (Maryland), PhD (Dal). Biological oceanography, marine ecosystem modelling

Louden, K.E., BA (Oberlin), MEd. (Temple), PhD (MIT). Marine geophysics

Moore, R.M., BA (Oxon.), PhD (Southampton). Chemical oceanography, low molecular weight halocarbons in the marine environment

Ruddick, B.R., BSc (Victoria), PhD (MIT). Physical oceanography

Thompson, K.R., BSc, MSc (Manchester), PhD (Liv), jointly with Math and Statistics, Canada Research Chair. Physical oceanography/climatology

Associate Professors

Folkins, I., BSc (Dal), MSc, PhD (Toronto), cross appointment with Physics. Stratospheric ozone modelling, atmospheric chemistry.

Kelley, D., BSc (MtA), PhD (Dal). Ocean mixing, deep convection, double diffusion, arctic mixing

Metaxas, A., BSc (McGill), MSc (UBC), PhD (Dal), (NSERC UFA). Benthic ecology, larval biology, deep-sea biology, community ecology

Sheng, J., BSc (East China Technical Univ), MSc, PhD (MUN), (NSERC/AES/MARTEC) Industrial Research Chair). Shelf circulation, ocean modelling, data assimilation

Taggart, C.T., BSc (Carleton), MSc (York), PhD (McGill). Fisheries oceanography and early life history phenomena, biological-physical interactions, population genetics

Thomas, H., MSc (Dusseldorf), PhD (Rostock). Chemical oceanography, marine carbon cycles, coastal seas.

Assistant Professors

Fennel, K., MSc, PhD (Rostock). Biogeochemical Modelling (Canada Research Chair)
Gentleman, W.C., BEng (McGill), PhD (Dartmouth) (Cross appointment with Enginering Mathemataics). Marine ecosystem modelling
Kienast, M., BSc (Clausthal), MSc (Keil), PhD (UBC) (CIAR Scholar). Paleoceanography, stable isotope geochemistry
Ross, T., BSc, PhD (Manitoba) (NSERC UFA). Acoustics, turbulence, biophysical interactions.

Adjunct Professors

Azetsu-Scott, K., BSc, MSc (Japan), PhD (Dal), Ocean circulation section, BIO, climate change, tracer studies and carbon cycles.
Cranford, P., BSc, PhD (Dal), BIO, Marine Environmental Sciences Division. Growth, reproduction and survival of bivalve molluscs
DiBacco, C., BSc, MSc (Dal), PhD (Scripps), BIO, Marine invertebrates.
Frank, K.T., BSc, PhD (Toledo), Dept. of Fisheries & Ocean, BIO Population dynamics, stock assessment, fisheries oceanography recruitment
Hellou, J., BSc (Montreal), MSc, PhD (UBC), Marine Environmental Sciences Division, BIO. Organic chemistry
Huismans, R., MSc, PhD (Vrije). Finite element modelling, sedimentary basin and passive margin formation, subduction.
Johnson, B., BEng (North Carolina), PhD (Dal), Gas exchange; bubbles
Li, W., BSc (UBC), PhD (Dal). Marine microbiology.
Mosher, D.C., BSc (Acadia), MSc (MUN), PhD (Dal), GSC Atlantic (BIO). Marine geological hazards
Oakey, N.S, BSc (McGill), MSc (Sask), PhD (McMaster), BIO. Physical oceanography, mixing processes in the ocean, instrumentation related to mixing processes
Piper, D.J.W., BA, MA, PhD (Cantab), BIO. Marine sedimentology
Ritchie, H., BSc (MtA), BA (Oxford), MSc, PhD (McGill). Numerical methods for atmosphere and oceans, atmosphere-ocean coupling, environmental prediction
Sathyendranath, S., BSc (St. Teresa's College), PhD (Univ. P.&M. Curie). Optical oceanography, remote sensing of ocean colour, marine primary production.
Smith, P.C., BSc MS (Brown), PhD (MIT/Woods Hole Oceanography Inst), Atlantic Oceanographic Laboratory, BIO. Continental shelf dynamics, air-sea interaction, data assimilation
Vezina, A., BSc (Laval), PhD (McGill), BIO, Ocean Sciences Division. Ecosystem modeling, physical-biological modeling
Wright, D.G., BSc (Laurentian), PhD (UBC), Atlantic Oceanographic Laboratory, BIO. Climate dynamics, coastal oceanography, geophysical fluid dynamics.

Adjunct Research Associate

Hanson, J.M., MSc (Ottawa), PhD (McGill), Gulf Fisheries Centre, DFO

I. Admission Requirements

A good Honours degree, or its equivalent, is required for admission to the Oceanography Department.

Undergraduate preparation may be in any of the basic sciences - Biology, Chemistry, Physics or Geology. Degrees in Atmospheric Science, Meteorology, Mathematics or Engineering are also acceptable if the undergraduate work includes a reasonably good background in relevant basic science.

II. Degree Programs

A. Master of Science (MSc)

For minimum time required to complete this program, see the Faculty of Graduate Studies Regulations in this calendar.

Minimum class requirements are a total of 5 half-credit classes at the 5000 level or higher, at least three of which must be chosen from the introductory classes (5110.03-5140.03).

Additional classes may be required to strengthen a student's background in basic science.
Research and a thesis are required.

B. Doctor of Philosophy (PhD)

For minimum time required to complete this program, see the Faculty of Graduate Studies regulations in this calendar. Students must complete at least 6 graduate level courses, including at least two Oceanography introductory core courses (5110.03 to 5140.03) outside the student's sub-discipline. Candidates are expected to meet an extra qualifying criterion. Consult the Oceanography Graduate Handbook for details.

Candidates must write and defend a proposal for thesis research.

Research and a thesis are required.

III. Class Descriptions

Not all classes are offered every year. Please consult timetable upon registration.

OCEA 5110.03: Geological Oceanography.

This class is intended to give a broad survey of topics in marine geology and geophysics for new students in Oceanography at a graduate level. No previous background in geology or geophysics is required. The class content covers recent methods and observations with quantitative applications to an understanding of geophysical and geological processes. Some topics covered in Part I are plate tectonics and seismic, heat flow, gravity and magnetic methods. In Part 2 patterns and processes of sediment transport and deposition are explored. Some laboratory exercises augment the lectures, including a field cruise to Bedford Basin. Third year and honors undergraduates only will be admitted by consent of the instructor.
INSTRUCTOR(S): K. Louden
CROSS-LISTING: OCEA 4110.03

OCEA 5120.03: Physical Oceanography.

This class explores the physical forces driving the oceans, and describes the responses of ocean water to these forces. Scales of ocean motion discussed range from currents of oceanic dimensions, like the Gulf Stream, through tides and waves, down to very small-scale random movements of water known as turbulence. This class takes a quantitative approach in which equations describing the fluid motions and phenomena are derived, analyzed and discussed. Quantitative problem-solving is emphasized in assignments.
INSTRUCTOR(S): D. Kelley
CROSS-LISTING: OCEA 4120.03

OCEA 5130.03: Chemical Oceanography.

This class covers the major and minor constituents of sea water, the controls on its chemical composition, nutrient cycling, gas exchange, and the influence of the oceans on atmospheric chemistry. Other topics included are chemical tracers, and radiochemical dating methods, stable isotope studies, chemical speciation and chemical models of sea water.
INSTRUCTOR(S): R.M. Moore
CROSS-LISTING: OCEA 4130.03

OCEA 5140.03: Biological Oceanography.

Biological oceanography is a quantitative science. Its goal is to describe how physical, chemical and biological processes interact to determine the species composition, biogeochemical activities, and trophic structure of marine communities. At the conclusion of this introduction to biological oceanography, students should possess a basic knowledge of biological oceanographic processes, and how they interact with the Earth's physical and chemical environment. Outstanding problems currently facing biological oceanographers and earth systems scientists will be discussed, as will current attempts and methodologies to address them. Students will demonstrate their accomplishment of these objectives by satisfactory performance on two examinations, completion of assignments including quantitative problem solving, and satisfactory participation in class discussion. Students should be competent in mathematics through calculus.
INSTRUCTOR(S): J. Cullen
CROSS-LISTING: OCEA 4140.03, BIOL 4661.03, 5661.03, MARI 4661.03

OCEA 5160.03: Fisheries Oceanography.

Students who are not competent with fundamental population dynamics, ecology, physical oceanography, calculus, statistics, and computerized analysis should not enroll. The class focuses on the ecology of marine fish (including significant advances made in freshwater systems) from an oceanographic perspective and on the biotic and abiotic influences on marine fish population dynamics and production, distribution and abundance. Lectures include reproduction, early life history, feeding, growth, metabolism, mortality, and recruitment variability and forecasting. Emphasis is placed on: 1) the hydrological and meteorological processes influencing the above; and on 2) the primary literature, current problems and hypotheses, and fruitful research directions, approaches and techniques. Some emphasis is also placed on the application of scientific insights to fishery management techniques. Students are required to write a primary publication-style research paper.
INSTRUCTOR(S): C. Taggart
CROSS-LISTING: BIOL 4369.03, OCEA 4160.03, MARI 4369.03

OCEA 5210.03: Time Series Analysis in Oceanography and Meteorology.

Time series analysis in both the time and frequency domain is introduced. The class is applied and students are required to develop their own computer programs in the analysis of time series drawn from real problems. Topics to be discussed include the nature of time series, stationarity, auto and cross covariance functions, the Box-Jenkins approach to model identification and fitting, power and cross spectra and the analysis of linear time-invariant relationships between pairs of series.
INSTRUCTOR(S): K. Thompson
CROSS-LISTING: OCEA 4210.03, STAT 5390.03, STAT 4390.03

OCEA 5220.03: Numerical Modelling of Atmospheres and Oceans.

This class is designed to give the student an in-depth knowledge of numerical modelling techniques for simulation of atmospheric and ocean circulations. Topics include finite difference, finite element and spectral methods for solving partial differential equations; accuracy and stability analysis of numerical schemes: a brief introduction to data assimilation and ensemble prediction methods; and boundary treatment for ocean models.
INSTRUCTOR(S): J. Sheng
CROSS-LISTING: OCEA 4220.03

OCEA 5221.03: Ocean Dynamics.

An advanced class for graduate students in Physical Oceanography and Atmospheric Science that studies the basic equations governing rotating geophysical flows, plus applications. Topics include geostrophy, conservation of potential vorticity, quasi-geostrophic dynamics, waves of frequency f, response to surface forcing (steady and unsteady), baroclinic/barotropic instability, quasi and semi-geostrophic frontogenesis, and tropical dynamics.
INSTRUCTOR(S): B. Ruddick
CROSS-LISTING: OCEA 4221.03

OCEA 5222.03: Estuary, Coast and Shelf Dynamics.

An advanced class in the physical processes operative on the continental shelf. Topics include long waves, tides, tidal mixing, thermohaline circulation, wind forcing, upwelling, etc.
INSTRUCTOR(S): J. Sheng
CROSS-LISTING: OCEA 4222.03

OCEA 5223.03: Ocean Waves.

This class will consider at an advanced theoretical level, several types of waves known to be important in the ocean, and use concepts like group velocity and wave refraction to link them. We plan to cover surface and internal gravity waves, Rossby and topographic shelf waves, and various problems related to refraction and interactions with currents.
INSTRUCTOR(S): A. Hay

OCEA 5230.03: Biology of Phytoplankton.

The role of phytoplankton as primary producers of organic material in the sea, and as agents of biogeochemical transformations, explored in the context of interactions with physical and chemical oceanographic processes. Emphasis is on the current literature.
INSTRUCTOR(S): M. Lewis/J. Cullen
CROSS-LISTING: OCEA 4230.03, MARI 4662.03, BIOL 4662.03

OCEA 5240.03: Special Topics in Physical Oceanography.

1-4 "topics" are taught based on the needs of students in the graduate program. Each "topic" is taught by a suitable faculty member through a combination of lectures, problem assignments, directed reading and group discussion. Potential topics include: Turbulence and mixing, Data Assimilation, Advanced Data Analysis Techniques, Observational Technologies, Climate Dynamics, Nonlinear Dynamics, Instabilities.
INSTRUCTOR(S): T. Ross
FORMAT: Lecture/Seminar
PREREQUISITE: Permission of instructor

OCEA 5250.03: Acoustical Oceanography.

This class covers the basic theory of sound propagation and scattering in the ocean environment, and the applications to acoustic remote sensing of the ocean interior. The areas of application include: physical oceanography, biological and fisheries oceanography, and marine geophysics and geology. This class is open to students with backgrounds in the life and environmental sciences, as well as in the physical sciences and engineering.
INSTRUCTOR(S): A. Hay
CROSS-LISTING: OCEA 4250.03

OCEA 5285.03: Marine Biogeochemical Processes.

This advanced class is designed for students interested in cutting-edge developments in marine biogeochemistry on time-scales ranging from seasonal to glacial-interglacial. Topics to be discussed include carbon and nutrient distributions and cycling, linkages between climate and marine biogeochemistry and their perturbations during the Anthropocene. The students will perform a guided literature survey and present selected topics during classes.
INSTRUCTOR(S): H. Thomas/M. Kienast
FORMAT: Seminar
PREREQUISITE: OCEA 4130.03/5130.03, OCEA 4140.03/5140.03

OCEA 5290.03: Advanced Chemical Oceanography.

This class presents topics that are at the cutting-edge of research in chemical oceanography, taught as 3-4 self-contained modules. Example topics include, the oceanic C02 system and its relation to climate change, chemical reactions in sediments and the consequent exchange of chemicals with the ocean, photochemistry in the upper ocean, and inferring the chemistry of ancient oceans through the isotope record in sediments.
INSTRUCTOR(S): R. Moore
CROSS-LISTING: OCEA 4290.03

OCEA 5292.03: Chemical Methods in Oceanography.

This class provides a more detailed account of analytical methods used in chemical oceanography. Included are the procedures for precise measurement of parameters of the inorganic carbon system in seawater, total inorganic carbon, alkalinity, partial pressure of carbon dioxide. Gas chromatography, mass spectrometry, stable isotope measurement and radiochemical methods will be covered. Emphasis is on techniques which are available either in our own laboratories or at neighboring institutions.
INSTRUCTOR(S): H. Thomas

OCEA 5293.03: Advanced Marine Particles.

A firm grasp of the processes governing transport of particles in the sea forms a basis for understanding key aspects of the marine carbon cycle, ocean productivity, and pollutant dispersal. It is also fundamental to the interpretation of ancient and modern sedimentary deposits. To build understanding of marine particles this class explores the various roles of particles in the sea and the processes that govern them. Topics to be covered include sources and types of marine particles, methods of particle characterization, patterns of vertical flux, vertical distribution of particles in the ocean, particle size distributions, settling velocities, mass transfer to

and from small particles, mechanics of particle contact, surface chemistry, and erosion, deposition and transport.
INSTRUCTOR(S): P. Hill

OCEA 5311.03: Fluid Dynamics I.

An introduction to the theory of fluid dynamics, with some emphasis on geophysically important aspects. Contents: tensor mathematics, flow kinematics, equations of motion, viscous flow, potential flow, convection, turbulence, and basic aerodynamics. Occasional reference will be made to current research topics, especially those in Physical Oceanography.
INSTRUCTOR(S): T. Ross
CROSS-LISTING: OCEA 4311.03, PHYC 4311.03/5311.03

OCEA 5330.03: Benthic Ecology.

An advanced level graduate class concentrating on the major problems of benthic ecology, such as how food is supplied to benthic animals, what factors control the structure of biological communities, and how the benthos is related to geomicrobiological processes in the sediments. The class is heavily oriented to the current literature. Classes consist of two lectures per week and one journal paper discussion session. The last 3 weeks of the class are devoted to a class research project. Students are required to have a background in ecology, statistics, and invertebrate zoology.
INSTRUCTOR(S): J. Grant
CROSS-LISTING: BIOL 4666.03, OCEA 4330.03

OCEA 5331.03: History of Marine Science.

This class describes the development of the marine sciences from biological, chemical, physical and geological knowledge going back to the 17th century or earlier. It includes the important voyages of exploration, the development of marine biology, ocean circulation and plate tectonics, also the importance of technological changes upon marine science.
INSTRUCTOR(S): E.L. Mills
CROSS-LISTING: BIOL 4664.03, HIST 3073.03, HSTC 3331.03, OCEA 4331.03, SCIE 4001.03, MARI 4664.03

OCEA 5335.03: Environmental Impacts in Marine Ecosystems.

Marine environments are subject to a variety of environmental impacts caused by resource extraction and utilization as well as waste disposal. These impacts arise from oil and gas production, ocean dumping, coastal habitat alteration and eutrophication, effluent inputs, urbanization, shipping, fisheries, and aquaculture. This class will review the effects of these types of activities on marine environments, with a focus on ecosystem level influences including dispersion, elemental fluxes, benthic impacts, food webs, and biodiversity. Approaches to quantifying these processes and predicting impacts will be explored. Specifically, simulation modelling of impacts and eco-systems will be undertaken using Stella graphical modelling software as well as other tools. The class will examine practical solutions to environmental assessment, monitoring, and prediction using modelling, data collection, and analysis. Classes will include lectures, modelling examples (computer projection), and discussion of research papers. Class requirements will consist of problem sets and a student modelling project.
INSTRUCTOR(S): J. Grant
CROSS-LISTING: OCEA 4335.03

OCEA 5370.03: Deep Sea Biology.

The class examines the biology of organisms inhabiting deep sea environments. We will explore physiological adaptations to the physical, chemical and geological environmental characteristics; describe spatial and temporal distributional patterns of the biological assemblages; examine regulatory factors of these patterns, such as ocean circulation, food availability, reproduction and recruitment; and delve into habitats of special interest such as hydrothermal vents and cold seeps.
INSTRUCTOR(S): A. Metaxas
CROSS-LISTING: BIOL 4370.03, OCEA 4370.03

OCEA 5380.03: Marine Modelling.

A graduate level survey of modelling techniques applied to biological-physical problems in oceanography. Lecture material includes: philosophy of modelling, dimensional analysis, parameterization of unresolved processes, numerical representation of ordinary or partial differential equations, model validation and fundamental limits to predictability and frequency domain analysis. Students are given the opportunity to study special topics in the current literature, e.g., prey-predator models, spatial patchiness models, models of the biomass size spectrum, models of pollutant dispersal, etc.
INSTRUCTOR(S): K. Fennel
CROSS-LISTING: OCEA 4380.03

OCEA 5411.03: Atmospheric Dynamics I.

See course description for PHYC 5411.03 in the Physics and Atmospheric Science section of this calendar.
INSTRUCTOR(S): T. Duck
CROSS-LISTING: OCEA 4411.03, PHYC 4411.03/5411.03

OCEA 5412.03: Atmospheric Dynamics II.

See course description for PHYC 5412.03 in the Physics and Atmospheric Science section of this calendar.
INSTRUCTOR(S): T. Duck
CROSS-LISTING: OCEA 4412.03, PHYC 4412.03/5412.03

OCEA 5500.03: Atmospheric Physics I.

See course description for PHYC 5500.03 in the Physics and Atmospheric Science section of this calendar.
INSTRUCTOR(S): T. Duck
CROSS-LISTING: OCEA 4500.03, PHYC 4500.03/5500.03

OCEA 5510.03: Atmospheric Physics II.

See course description for PHYC 5510.03 in the Physics and Atmospheric Science section of this calendar.
INSTRUCTOR(S): G. Lesins
CROSS-LISTING: OCEA 4510.03, PHYC 4510.03/5510.03

OCEA 5520.03: Introduction to Atmospheric Science.

See course description for PHYC 5520.03 in the Physics and Atmospheric Science section of this calendar.
INSTRUCTOR(S): I. Folkins
CROSS-LISTING: OCEA 4520.03, PHYC 4520.03/5520.03

OCEA 5541.03: Synoptic Meteorology I.

See course description for PHYC 5540.03 in the Physics and Atmospheric Science section of this calendar.
INSTRUCTOR(S): P. Ford
CROSS-LISTING: OCEA 4541.03, PHYC 4540.03/5540.03

OCEA 5550.03: Synoptic Meteorology II.

See course description for PHYC 5550.03 in the Physics and Atmospheric Science section of this calendar.
INSTRUCTOR(S): S. Miller
CROSS-LISTING: OCEA 4550.03, PHYC 4550.03/5550.03

OCEA 5570.03: Light Scattering, Radiative Transfer , and Remote Sensing.

The equations of radiative transfer through the atmosphere will be developed and used. Special topics include transfer of infrared radiation, Mie scattering, absorption by atmospheric gases and aerosols, transfer through clear and cloudy atmospheres. Also remote sensing techniques and radiative transfer models are covered.
INSTRUCTOR(S): R. Martin
CROSS-LISTING: PHYC 5570.03

OCEA 5575.03: Topics in Atmospheric Radiation.

See course description for PHYC 6575.03 in the Physics and Atmospheric Science section of this calendar.
CROSS-LISTING: PHYC 6575.03

OCEA 5580.03: Cloud Physics.

See course description for PHYC 6580.03 in the Physics and Atmospheric Science section of this calendar.
INSTRUCTOR(S): Staff
CROSS-LISTING: PHYC 6580.03

OCEA 5595.03: Atmospheric Chemistry.

This class will discuss the reactions that govern the distribution of chemical species in the troposphere and stratosphere. It will include such topics as the ozone layer and the reasons for its depletion over Antarctica, the formation of acid rain, and photochemical smog. It is desirable for students taking this class to have taken "Introduction to Meteorology" previously or have some other previous exposure to Atmospheric Science.
INSTRUCTOR(S): R. Martin
CROSS-LISTING: OCEA 4595.03

OCEA 5680.03: Ecosystem Modelling of Marine and Freshwater Environments.

Students develop and apply mathematical models of marine and freshwater ecosystems to study biological production, biogeochemical cycling etc. Lectures provide theoretical background for coupling nutrient and plankton dynamics, including parameterizing biological processes and physical effects. Computer sessions provide hands-on modelling experience. Students also critique literature and conduct an independent research project.
INSTRUCTOR(S): W. Gentleman
CROSS-LISTING: ENGM 6680.03, ENGM 4680.03

OCEA 6500.03: Graduate Seminar in Tectonics.

A lecture and seminar class on quantitative aspects of tectonics that focuses on plate boundary processes on geological timescales.
INSTRUCTOR(S): C. Beaumont/R.A. Jamieson
CROSS-LISTING: ERTH 6500.03

OCEA 9000.00: MSc Thesis.

OCEA 9530.00: PhD Thesis.

In addition to the weekly oceanographic departmental seminar, each of the oceanographic subdisciplines has a regular seminar in its specialty. At the seminar, topics of specific interest are discussed and examined. Students are required to attend both the general departmental seminar and the specialty seminar in their field of interest.

Oil and Gas Engineering

Location: Sexton Campus (A108)
Telephone: (902) 494-1288
Fax: (902) 494-3149
Email: oil.gas.engineering@Dal.ca
Website: www.dal.ca/engineering/oilandgas

Graduate Coordinators (Engineering Departments)

See calendar entries for Civil Engineering, Electrical and Computer Engineering, Engineering Mathematics, Industrial Engineering, Mechanical Engineering, or Process Engineering and Applied Science.

Faculty

Faculty members with appointments in the various departments of the Faculty of Engineering are directly involved in teaching and research activities in oil and gas engineering.

Gagnon, G.A., (PhD Waterloo; PEng). Civil Engineering. Environmental engineering and management for offshore oil and gas activities.

Islam, R., (PhD Alberta; PEng). Enhanced oil recovery. Environmental impact of oil and gas production. Greenhouse gas mitigation.

Pelot, R.P., (PhD Waterloo; PEng). Industrial Engineering. Marine risk analysis; environmental management; resource economics; scheduling and planning.

Rockwell, M.C., (PhD TUNS; PEng). Petroleum engineering, reservoir engineering, mine and waste management, mine production engineering, ocean mining.

Taheri, F., (PhD TUNS; PEng).Civil Engineering. Advanced composite materials, finite element methods (elastic, plastic), fracture mechanics. Oil and gas pipelines.

Yuet, P., (PhD MIT; PEng). Chemical Engineering. Characteristics of complex fluids, colloids and surfactants. Chemical engineering thermodynamics. Oil and gas exploration techniques.

Zou, D.H, (PhD UBC; PEng). Mining Engineering. Rock mechanics. Ground support and stability control, tailings disposal. Well drilling and completion, mud disposal and handling.

I. Introduction

The "Oil and Gas Engineering Program" of the Faculty of Engineering encompasses a broad range of education and research activities relating to the oil and gas industry. The Program is supported by expertise, experience and resources drawn from all of the departments in the Faculty of Engineering.

II. Degree Programs

The Master of Engineering (Petroleum Engineering) Degree Program is available to graduate professional engineers seeking a thorough introduction to the field of petroleum engineering (see Petroleum Engineering entry for details). Contact the Graduate Coordinator for Petroleum Engineering regarding matters relating to this degree program.

Research degree opportunities in oil and gas engineering are available through the various disciplinary departments of the Faculty of Engineering. The Master of Applied Science (MASc) Degree Programs offered by the departments (e.g. Civil, Mechanical Engineering, or Process Engineering and Applied Science) are open to engineering and science graduates seeking an introduction to petroleum engineering along with acquiring research expertise. The curricula for these programs consist of core courses, approved electives, and a research thesis. Each student's program of studies is designed to suit his or her background, interests and research project area. Students completing the MASc degree or equivalent may proceed with advanced study and research leading to the Doctor of Philosophy (PhD) Degree in Engineering. Contact the Graduate Coordinator for one of the engineering departments regarding matters relating to these degree programs.

Oral and Maxillofacial Surgery

Location: 5981 University Avenue
Halifax, NS B3H 3J5
Telephone: (902) 494-1679

Chair
Goodday, R.H.B., DDS, MSc (Dal), FRCD(C)

Honourary Chair
Delaire, Jean, MD, DDS, LLD

Director of Residency Training
Morrison, A.D., DDS, MSc, FRCD(C). Trauma and orthognathic surgery, reconstructive pre-prosthetic surgery

Honourary Professor
Natsume, N., DDS, MD, PhD

Professors Emeriti
Cohen, M.M., Jr., AB (Mich), DMD (Tufts), MSD (Minn), MPH (Boston), PhD (Minn), FCCMG, Division of Oral and Maxillofacial Pathology. Syndromology, genetics, pediatrics
Lovely, F.W., DDS (Dal), MS (Mich), FRCD(C) FICD, FACD

Professors
Coonan, T.J., MD, FRCP(C). Neuroanesthesia
Holness, R., BSc, FRCS(C), DABNS
Precious, D.S, DDS, MSc (Dal), FRCD(C), FICD, FADI, FACD. Dento-facial deformities, cleft palate and/or lip

Associate Professors
Alexander, D., MD, FRCS(C)
Amirault, D., MD, FRCS(C). Outcomes, research in total knee replacement and fractures
Davis, B., DDS, FRCD(C)
Goodday, R.H.B., DDS, MSc (Dal), FRCD(C), Chair. Orthoganthic Surgery
Leahey, L., MD, FRCS(C)
Lovas, J.G.L., BSc, DDS (Toronto), MSc (Western), FRCD(C). Oral and maxillofacial pathology
Morrison, A.D., DDS, MSc, FRCD(C). Director of Residency Training. Trauma and orthognathic surgery, pre-prosthetic reconstructive surgery
Wright, B.A., BDS (London), LDS, RCS (Eng), DDS (Dal), MS (Indiana), MD (Dal), FRCP(C), FACS.

Assistant Professors
Hung, O., MD, Cert. in Anaesthesia, FRCP(C)
Yabsley, R.H., MD, BSc (Med), FRCS(C), FACS. Medical, legal and independent medical insurance examination

The six-year program in Oral and Maxillofacial Surgery and Medicine which starts on June 1st each year is designed to provide students with a comprehensive background for the practice and teaching of Oral and Maxillofacial Surgery, and to qualify them for examination by the Royal College of Dentists of Canada.

Particular emphasis is placed upon the basic sciences, medicine and clinical hospital surgery practice.

I. Admission Requirements

Candidates to be considered must possess either a DDS or DMD and be eligible for student Licensure in the Province of Nova Scotia (as granted by the Provincial Dental Board of Nova Scotia).

Candidates must register for the entire six years of the program and pay full tuition for the first five years and thesis only registration for the sixth year.

Application must be completed prior to August 31 of the year preceding commencement of the program.

II. MD/MSc Degree Program Requirements

1. Satisfactory completion or credit for the prescribed classes
2. Satisfactory knowledge and skills in all the phases of clinical oral and maxillofacial surgery
3. Satisfactory completion of a research study and submission of the results in the form of a thesis acceptable to the Director of the program

In addition to the requirements for successful completion of the MD degree, the following classes are required to complete the MSc component of the program.

III. Class Descriptions

Not all classes listed are necessarily offered in any given year.

ORAL 5000.06: Anatomy.
This class is offered during the 1st year, consists of 14 hours of lectures and 36 hours of dissection and serves as an overview of the anatomy of the chest, thoracic cavity, arm and iliac crest areas of the pelvis. Detailed anatomy of the head and neck shall be covered. Emphasis will focus on anatomical structures and adjacencies as they relate to deformities, injuries and other pathological processes of the head and neck.

ORAL 5010.06: Surgical Anatomy.
This class is offered during the 1st year and consists of 30 hours of dissection. It permits the graduate student to perform a variety of surgical procedures on the cadaver. The opportunity exists to not only practice the steps of the surgical procedures but to explore the major anatomic adjacencies.

ORAL 5060.06: Oral and Maxillofacial Pathology.
This class is presented to residents over a two-year period, twice during the 4 years of their program. Students study the cause, pathogenesis, clinical, radiographic and microscopic characteristics of diseases affecting the oral and peri-oral structures. Emphasis is placed on recognition of abnormalities, formulation of differential diagnoses, arrival at definitive diagnoses and patient management.
CROSS-LISTING: ORAL 6030.06, ORAL 7000.06

ORAL 5070.06: Oral and Maxillofacial Surgery Seminar. (Audit)
This class is offered during all 6 years of the MSc component of the program. This seminar, with all the Oral and Maxillofacial Surgery Senior Staff and residents, will: 1) review, by subjects, the various major treatment aspects in the total practice of Oral and Maxillofacial Surgery by Resident presentation, 2) have monthly case reviews, 3)discuss on a monthly basis pertinent topics researched in the literature.
CROSS-LISTING: ORAL 6040.06, 7010.06, 8010.06

ORAL 5080.06: Clinical Oral and Maxillofacial Surgery.
Is presented during all 6 years of the MSc component of the program. A major portion of the Graduate Student's time will be spent in the provision of Oral and Maxillofacial Surgical services for patients. Residents will be given increasing responsibility for the care of out-patients in the Teaching Unit and shall be responsible, through the Senior Resident, to the Chief of the Service. The Senior Resident shall provide care for all in-patients under supervision.
CROSS-LISTING: ORAL 6050.06, 7020.06, 8000.06

ORAL 6000.06: Anesthesia.
This is a four month rotation. Working with a tutor assigned monthly, the Oral and Maxillofacial Surgery Resident will be supervised in pre-operative and post-operative rounds, and in the minute-to-minute administration of anesthesia in the operating room. Covered under Medicine Curriculum.

ORAL 6010.06: Medicine.
The objectives of this one month rotation are: 1) to participate in the management of patients who have either cardiac or respiratory disease; 2) to develop skills of assessing patients in order to consult intelligently with the Department of Medicine; 3) to prepare for anesthesia rotation. Covered under Medicine Curriculum.

ORAL 6030.06: Oral and Maxillofacial Pathology.
CROSS-LISTING: ORAL 5060.06.

ORAL 6040.06: Oral and Maxillofacial Surgery Seminar.
CROSS-LISTING: ORAL 5070.06

ORAL 6050.06: Clinical Oral and Maxillofacial Surgery.
CROSS-LISTING: ORAL 5080.06

ORAL 6060.06: Orthopaedics.
This is a two-month rotation with the main objectives being: 1) to provide the resident with sufficient clinical experience to harvest bone solo from the iliac crest; 2) to support the clinic skills in (1) with an appreciation of general principles of bone management; 3) to allow participation in the management and care of the polytraumatized patient.
Covered under Medicine Curriculum

ORAL 6070.06: Infectious Diseases.
This rotation is one month. The objectives of the rotation are: 1) to participate in the management of patients who have been admitted to the Infectious Diseases service; 2) to apply skills and knowledge acquired in Microbiology class; 3) to acquire the skills of responsible and appropriate use of antimicrobial agents. Covered under Medicine Curriculum

ORAL 6080.06: Emergency Medicine.
This is a one month rotation with its objectives being: 1) to participate in the general management of patients in an emergency situation; 2) to apply skills acquired on Orthopedics and Anesthesia in the management of the emergency patient; 3) to manage and instruct Emergency Room staff in the techniques of facial fracture treatment. Covered under Medicine Curriculum

ORAL 6090.06: Neurosurgery.
This is a one month rotation. Covered under Medicine Curriculum.

ORAL 7000.06: Oral and Maxillofacial Pathology.
CROSS-LISTING: ORAL 5060.06.

ORAL 7010.06: Oral and Maxillofacial Surgery Seminar.
CROSS-LISTING: ORAL 5070.06

ORAL 7020.06: Clinical Oral and Maxillofacial Surgery.
CROSS-LISTING: ORAL 5080.06

ORAL 7030.06: Research.
The graduate student shall complete a research project and publish their findings in a thesis, acceptable to the Senior Staff, Program Director and Faculty of Graduate Studies. All or animal studies pertaining to research requirements shall be completed prior to January 1 of the final year. The complete first draft of thesis shall be available to committee by February 15, with the completed document ready by April 1 of the senior year.
CROSS-LISTING: ORAL 9000.00

ORAL 8000.06: Clinical Oral and Maxillofacial Surgery.
Covered under 5080.06

ORAL 8010.06: Oral and Maxillofacial Surgery Seminar.
Covered under 5070.06

ORAL 9000.00: Thesis.
Covered under 7030.06

IV. Medicine
First Year
Second Year
Clinical Years (Full clinical rotations of all disciplines including those specifically listed above.)

Please refer to the Four-Year Program in the undergraduate calendar for Medicine.

Pathology

Location: Sir Charles Tupper Building, 11th Floor
5859 University Avenue
Halifax, NS B3H 4H7
Telephone: (902) 494-2091
Fax: (902) 494-2519

Head of Department

Heathcote, J.G.

Graduate Coordinator

Greer, W.L.

Professors

Anderson, D., M.D., FRCPC Blood transfusion therapy; thromoembolic disorders

Greer, W.L., BSc, PhD (Western), FCCMG - Graduate Studies Coordinator. Human molecular genetics; molecular diagnosis of cancer.

Guernsey, D.L., BA (Lehigh), MS (Bridgeport), PhD (Hawaii). Molecular oncology; genetic basis of human disease; molecular neurobiology.

Guha, A.K., BSc, MD, MSc, PhD (Dal), FRCP(C). Autoimmune disease testing & use of monoclonal antibodies for cancer detection and therapy.

Hanly, J., MD (University College. Cork, Ireland); Rheumatology

Hoskin, D., BSc, PhD (McGill). Tumour immunology, cancer biology, apoptosis

Issekutz, A., MD (Dal) FRCP (C) (major appointment in Department of Microbiology and Immunology). Pediatrics (inflammation).

Issekutz, T., MD (Dal), FRCP (C). Pediatric immunology, inflammation.

Lee, P.W.K., PhD (Alberta) Molecular Virology, Cancer Biology

Lee, T., PhD (Glasgow) (major appointment in Department of Microbiology and Immunology). Immunoregulation, transplantation immunology and herbal medicine.

Marshall, J.S., BSc, PhD (Manchester) (major appointment in Department of Microbiology and Immunology). The role and regulation of mast cells in immune responses to bacteria, viruses and tumours, regulation of cytokines in inflammatory bowel diseases and asthma.

Nanji, A., MB, ChB, FRCPC (C) Path (Univ. of Nairobi) Medical biochemistry; liver pathophysiology

Nassar, B.A., BSc (Beirut), PhD (Newcastle), MB, BCh (Cairo), FRCP(C). Essential fatty acids and prostaglandins; molecular diagnosis of hyperlipidemias; familial cancers; porphyrias.

Associate Professors

Fraser, R.B., MSC, MD (Dal), FRCP(C), FCAP, PP

Gupta, R., MB, BS (India), FRCP(C). Kidney transplantation - chronic rejection; uropathology.

Riddell, D.C., BSc, PhD (Queen's) . Tumour suppressors; human molecular genetics.

Sadek, I., MB (Cairo) FRCP. Hematopathology.

West, K., MD (Western). Dendritic cells and their interaction with T cells and the immune response; transplantation.

Xu, Z., MD (Shanghai Medical University). Pulmonary pathology; cytopathology

Assistant Professors

Dellaire, G., BSC, PhD (McGill). Cancer biology, DNA repair

Easton, A., MBBS, PhD (Univ of London) Neuropathology

Hancock Friesen, C., MD, MSc (University of Alberta). Cardiology; transplant immunology

Hirsch, G., MD (Mt. Sinai). (major appointment in Department of Surgery) Surgery.

Johnston, B., PhD (Calgary). Inflammation and immune response (major appointment in Department of Microbiology and Immunology).

Legaré, J.F., MD (McGill). Transplatation and mechanism of heart failure (major appointment in Microbiology and Immunology

Liwski, R., MD, PhD, FRCPC (Dal); hematopathology.

Research for the MSc degree may be conducted in experimental pathology and/or allied fields of medical sciences (e.g. clinical chemistry, hematopathology, histopathology or molecular pathology and molecular genetics) for those planning a career as a laboratory scientist.

I. Admission Requirements

Candidates must satisfy the general requirements for admission to the Faculty of Graduate Studies. In addition, candidates with the MD degree may be admitted.

A. Master of Science (MSc) in Pathology

This program is intended to give the student a strong background in the experimental approach in pathology. Although the program may be completed in 12 months, most students require 24 months.

The research work and thesis defence are valued at 3 credits. All students are required to attend and participate in the research seminar program (PATH5091.03) for a credit value of ½. Those students without a medical background are required to take PATH5000, Introductory Pathology for a credit value of ½. Other classes may be required depending upon the background of preparation of the student, the nature of their thesis or the student's career goals, bringing the total requirement to 5.0 credits.

Candidates are expected to participate as appropriate in a weekly series of seminars or journal clubs in immunopathology, laboratory medicine or molecular pathology/genetics.

Research and a thesis are required. The thesis must be defended by oral examination which covers the candidate's area of study and research. Yearly presentations to the Department are required of every candidate.

B. Doctor of Philosophy (PhD) in Pathology

Pre-requisite for acceptance into this program is an MSc degree in Pathology or other Life Sciences field or an MD degree with research experience. Students entering from a BSc would first enter the MSc program but could transfer to the PhD before completing the MSc provided that the student had made satisfactory progress and the project had sufficient scope and depth. Class requirements are the same as for MSc students. Candidates are required to pass both a written and oral comprehensive examination, but the most significant requirement is the preparation and oral defense of his/her thesis describing an extensive original investigation. The minimum time requirement for PhD study is two years for students with an MSc or three years for those transferring from an MSc program.

C. MD/PhD in Pathology

Applications to this program could be considered once the candidate has been accepted into medical school.

II. Class Descriptions

PATH 5000.03: General Pathology.

This class covers basic systems and processes in pathology.
INSTRUCTOR(S): A.Ostry

PATH 5001.03: Advanced Mechanisms of Pathology.

This class will provide an in-depth study of such topics as cell injury, adaptation and repair and inflammatory mechanisms followed by specific diseases of the cardiovascular, central nervous, gastrointestinal and genitourinary systems.
INSTRUCTOR(S): A. Easton

PATH 5011.03: Biochemistry of Clinical Disorders I.

This class is an introduction to the pathophysiology of disease. It provides the clinical and biochemical background to disease groups and system disorders and the laboratory approach to their diagnosis. Topics include cardiovascular, renal, gastrointestinal and hepatobiliary disorders, in addition to acid-base, blood and immune abnormalities.

INSTRUCTOR(S): TBA
CROSS-LISTING: BIOC 4811.03/5811.03

PATH 5012.03: Biochemistry of Clinical Disorders II.

This class is an introduction to the pathophysiology of disease. It uses the same approach as PATH 5011.03 but different groups of diseases are discussed. Topics include carbohydrate, lipid and amino acid disorders; endocrine and rheumatological diseases, as well as tumor markers and toxicology.
INSTRUCTOR(S): TBA
CROSS-LISTING: BIOC 4812.03/5812.03

PATH 5027.03: Molecular Mechanisms of Cancer.

An in-depth study of the molecular and genetic basis of cancer. The multi-step nature of carcinogenesis will be the broad basis for studying oncogenes, tumour suppressor genes, genes regulating differentiation and apoptosis, and cancer susceptibility genes. Certain molecular biology techniques will be discussed in order to fully understand the molecular events of cancer.
INSTRUCTOR(S): P. Lee
CROSS-LISTING: MICI 4027.03/5027.03, BIOC 4027.03

PATH 5035.03: Human Genetics.

Topics include inborn errors of metabolism, human development, transmission genetics, DNA structure, gene function, mutation and chromosomal alterations, population genetics, genetics of immunity and cancer, genetic technology in medicine and ethical and social issues related to medical genetics.
INSTRUCTOR(S): Drs. W.L. Greer, D.C. Riddell
CROSS-LISTING: BIOL 4035.03/5035.03/BIOC 4835.03

PATH 5040.03: Pathobiology of Cancer.

This class will outline the pathobiology of neoplasia. It will discuss both normal and abnormal mechanisms of cell growth and differentiation since cancer is ultimately a disease of these processes. The basic biology of carcinogenesis and behavior of tumours will be highlighted. The clinical aspects of cancer management will also be presented.
INSTRUCTOR(S): L. Geldenhuys

PATH 5050.03: Immunopathology.

This class will explore the intricacies, functions and abnormalities of the immune system. Both the humeral and cellular arms of the immune system will be detailed. Immunological deficiencies and autoimmune diseases will be discussed. Clinical aspects of topics such as transplantation and tumour immunology will also be presented.
INSTRUCTOR(S): A . Guha

PATH 5051.03: Special Topics: Molecular Pathology and Molecular Genetics.

Molecular Biology of Inherited Disorders
This class is a graduate level introduction to the molecular mechanisms of both Mendelian and non-Mendelian genetic disorders. After a brief review of molecular themes, we will look at the molecular mechanism of pathogenesis in different categories of abnormalities, including chromosomal, structural, metabolic (amino acid, carbohydrate and lipid), intercellular and membrane transport, regulation of cell proliferation, multifactorial, etc. The class format is 2 weekly time slots of 1.5 hr each. The class material is covered by a combination of lectures and student presentations of selected articles. It is anticipated that there will be no final exam: instead each student will be required to submit a grant application that will be peer-reviewed by the other students, and then presented and defended in front of the group. Class marks are based on participation throughout the term (40%), and performance relating to the grant application and review (60%). Completion of previous classes in genetics and in molecular biology is recommended.
INSTRUCTOR(S): C. Riddell

PATH 5060.06: Special Topics: Morphometrics and Stereology.

PATH 5065X/Y.06: Directed Readings.

This class provides an opportunity for individual students to study, in depth, a subject related to pathology that isn't offered as a formal class at Dalhousie. A supervisor is chosen for each student, based on his/her expertise and the topic of interest. The student and supervisor meet regularly to discuss assigned readings. The student must prepare a written paper or oral presentation to the Department each term.
CLASS COORDINATOR: W. Greer
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

PATH 5066.03: Directed Readings.

See course description for PATH 5065X/Y.06

PATH 5067.03: Directed Readings.

See course description for PATH 5065X/Y.06

PATH 5080.03: Special Topics: Immunocytochemistry and Histochemistry.

Basics of immunostaining technique including fluorescent and peroxidase methods, FACS analysis. Applications in various fields of diagnostic surgical pathology. In situ DNA/RNA hybridization methods for infectious agents.
INSTRUCTOR(S): Staff

PATH 5091X/Y.03: Pathology Research Seminar Series.

The objectives of this class are: 1) to provide a forum for graduate students to develop skills at presenting seminars; 2) to provide constructive evaluation of their research; and 3) to promote interaction between students and faculty.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): W.L. Greer

PATH 5092.03: Pathology Research Seminar

See course description for PATH 5091X/Y.03

PATH 5093.03: Pathology Research Seminar

See course description for PATH 5091X/Y.03

PATH 5100.03: Processes and Mediators of Inflammation.

The objectives of this class are to provide students with an in-depth understanding of the major mechanisms of inflammation at a molecular and cellular level; to introduce students to the current research questions and emerging methods of treatment for inflammation; to develop student critical appraisal skills as they relate to the current scientific literature in this area.
INSTRUCTOR(S): J. Marshall, B. Johnston
CROSS-LISTING: MICI 4100.03, 5100.03

PATH 9000.00: MSc Thesis.

PATH 9530.00: PhD Thesis.

III. Seminars - Conferences

A series of weekly seminars, journal clubs, and conferences is conducted throughout the year in various areas of pathology, and laboratory medicine.

IV. Areas of Specialization for MSc or PhD Degree

- Hematology, Oncology: D. Anderson
- Cancer biology, DNA repair: G. Dellaire
- Neuropathology: A. Easton
- Animal models of diabetes: R.B. Fraser
- Human molecular genetics; molecular diagnosis of cancer: W.L. Greer
- Molecular oncology; genetic basis of human disease; molecular neurobiology: D.L. Guernsey
- Autoimmune disease testing and use of monoclonal antibodies for cancer detection and therapy: A.K. Guha
- Kidney transplantation-chronic rejection; uropathology: R. Gupta
- Cardiology; Transplant Immunology: C. Hancock Friesen
- Rheumatology: J. Hanly
- Chronic rejection; allograft arteriosclerosis; vascular biology; cell adhesion molecules and T cell infiltration; cytolytic cell role in transplantation: G. Hirsch
- Tumor immunology: D. Hoskin
- Pediatrics (Inflammation): A. Issekutz
- Pediatric Immunology, Inflammation: T. Issekutz
- Inflammation and immune responses: B. Johnston
- Molecular Virology, Cancer Biology: P. Lee
- Immunoregulation, transplantation immunology and herbal medicine: T. Lee
- Transplantation and mechanism of heart failure: J.F. Legaré
- Hematopathology: R. Liwski
- Role and regulation of mast cells in immune responses to bacteria, viruses and tumors. Regulation of cytokines in inflammatory bowel diseases and asthma: J.S. Marshall
- Medical biochemistry; liver; pathophysiology: A. Nanji
- Essential fatty acids and prostaglandins; molecular diagnosis of hyperlipidemias; familial cancers; porphyrias: B. Nassar
- Tumor suppressors; human molecular genetics: D.C. Riddell
- Hematopathology: I. Sadek
- Dendritic cells and their interaction with T cells and the immune response; transplantation: K. West
- Pulmonary Pathology; Cytopathology: Z. Xu

Petroleum Engineering

Location: Sexton Campus (A108)
Telephone: (902) 494-1288
Fax: (902) 420-7639
Email: gsr@dal.ca
Website: www.dal.ca/engineering/oilandgas

Graduate Coordinator

Pegg, M.J., BSc, PhD (Leeds), PEng

Faculty

Faculty members with appointments in the various disciplinary departments of the Faculty of Engineering and the Faculty of Science who are directly involved in teaching the core Petroleum Engineering program are:

Fels, M., (PhD Waterloo; PEng). Air and water pollution control, process development.
Garagash, D., (PhD Minnesota). Fracture mechanics
Hill, J., (PhD Waterloo). Environmental geology, petroleum geology.
Pegg, M.J., (PhD Leeds; PEng). Safety and loss prevention in the process industries, fire and explosion hazards.
Rockwell, M.C., (PhD TUNS; PEng). Petroleum engineering, reservoir engineering, mine and waste management, mine production engineering, ocean mining.
Wach, G.D., (PhD Oxford). Petroleum geology, sequence strategraphic, siesmic well log, basin analysis, sedimentology, depositional environments.
Yuet, P., (PhD MIT; PEng). Chemical Engineering. Characteristics of complex fluids, colloids and surfactants. Chemical engineering thermodynamics. Oil and gas exploration techniques.

I. Introduction

Petroleum engineering at Dalhousie is viewed as a specialized professional discipline focused on the fundamental knowledge and skills associated with the production, transport and processing of petroleum products. The petroleum industry traditionally distinguishes between its "upstream" and "downstream" sectors. Engineers in the "upstream" sector deal with oil and gas reservoir facilities and operations for exploration and production; engineers in the "downstream" sector focus on the transportation, processing, refining and distribution of petroleum products. Upstream activities in Atlantic Canada's petroleum industry are associated primarily with offshore resources, involving quite distinct technical and environmental circumstances.

II. Degree Programs

MEng Degree in Petroleum Engineering

This degree program is designed primarily for graduate professional engineers seeking a thorough introduction to the field of petroleum engineering. The curriculum (academic year 2007-08) consists of a core set of six prescribed courses, one approved elective, a graduate seminar, and a project.

The core courses in petroleum engineering are:

- PETR 6010.03: Reservoir Engineering
- PETR 6030.03: Natural Gas Reservoirs
- PETR 6040.03: Drilling Engineering
- PETR 6060.03: Petroleum Geoscience
- PETR 6050.03: Production Technology
- PETR 6980.03: Directed Studies

Approved elective courses may be chosen from a variety of subjects to suit each student's disciplinary background, oil and gas industry interests, and professional project area. Subjects include advanced classes in engineering disciplines and classes in law, economics, earth science, environmental studies and oceanography. Descriptions of these classes are in the Graduate Studies Calendar.

Engineering classes from various disciplines are available as electives for students of petroleum engineering. Examples include:

- CIVL 6147.03: Advanced Theory of Structures
- MECH 6701.03: Dynamics of Offshore Structures
- CIVL 6144.03: Geotechnical Aspects of Waste Management
- PETR 6020.03: Enhanced Oil and Gas Recovery
- CHEE 6737.03: Chemical Process Control
- MATL 6014.03: Welding Metallurgy
- MATL 6030.03: Fracture of Metallic Materials
- MINE 6010.03: Solid-Liquid Separation
- MINE 6001.03: Advanced Rock Mechanics
- MECH 6510.03: Advanced Mechanics of Solids
- ENGM 6662.03: Dynamics of Ocean Fluids
- FOSC 6333.03: Industrial Rheology
- IENG 6912.03: Introduction to Operations Research
- IENG 6924.03: Capital Investment and Capacity Expansion Planning
- IENG 6918.03: Decision Analysis
- ENGM 6674.03: Theory of Random Fields
- MINE 6008.03: Advanced Petroleum Engineering
- MINE 6009.03: Offshore Drilling and Production

Selections from this list are expected to be consistent with the student's background, interest, and research or project area. Electives may also be chosen from the following list of classes in related disciplines:

- LAWS 2104.03: Environmental Law I
- ECON 5516.03: Resource and Environmental Planning
- ERTH 5270.03: Applied Geophysics
- ENVI 5004.03: Management of Chemicals and Wastes
- OCEA 5120.03: Introduction to Physical Oceanography

Both of these elective lists are illustrative and subject to revision.

III. Class Descriptions

PETR 6010.03: Reservoir Engineering.

Basic concepts, principles and techniques relating to hydrocarbon reservoirs from an engineering viewpoint. Properties of reservoir rocks and reservoir fluids are examined in association with developing an understanding of the dynamics of fluid flow in porous rock. Review of basic well logging instruments and determination of reservoir characteristics.

PETR 6020.03: Enhanced Oil and Gas Recovery.

Basic concepts and principles relating to primary, secondary and enhanced recovery of oil and gas. Reservoir simulation — model types and principles, methods of model formulation, particular aspects of gas reservoir modelling, reservoir case study data, use of commercial reservoir simulators, etc. Overall economic and environmental assessment of the development of oil and gas fields.

PETR 6030.03: Natural Gas Reservoirs.

Types of well tests and their use in analysis of reservoir production performance. Automated well logging data systems and well data analysis software applications. Case studies of gas reservoirs — e.g. the Sable gas fields. Introduction to reservoir production management (planning, performance analysis, forecasting, data management, and economics).

PETR 6040.03: Drilling Engineering.

Overview of drilling activities with an emphasis on offshore operations. Design of drilling tools (systems, drilling bits) and study of drilling techniques (directional, horizontal, MWD, etc.) and drilling fluids. Basic well completion (design requirements, materials, equipment, and procedures). Economic, health, safety and environmental aspects of drilling.

PETR 6050.03: Production Technology.

Overview of oil and gas production facilities with an emphasis on offshore situations. Engineering design and operation of wells, pipelines, and oil and gas processing equipment. Health, safety and environmental aspects of production operations.

PETR 6060.03: Petroleum Geoscience.

Petroleum exploration and hydrocarbon reservoirs from the perspective of professional geoscientists. Exploration methods (magnetic, gravity, seismic, borehole, telemetry, etc.) Subsurface and marine geology used to interpret measurement data. Generation and migration of petroleum, geological traps and seals, and sedimentary basins. Assessment of hydrocarbon reserves. Environmental impacts of exploration activities.

PETR 6980.03: Directed Studies in Petroleum Engineering.

This class provides an opportunity to pursue studies in a specific area of petroleum engineering in which no graduate classes are offered. Studies must be pursued according to a clear plan under the guidance of a designated faculty member.

PETR 6990.00: Graduate Seminar in Petroleum Engineering.

This seminar is designed for communication and discussion on the latest research and technical developments in petroleum engineering and the oil and gas industry. Each student is required to make an oral presentation, in accordance with Faculty guidelines, on a topic relating to his/her thesis or project work.

PETR 9000.00: MEng Project.

Pharmacology

Location: Sir Charles Tupper Medical Building, Sixth Floor
5850 College St.
Halifax, NS B3H 1X5
Telephone: (902) 494-1384
Fax: (902) 494-1388
Email: pharmacology@dal.ca

Head of Department

Sawynok, J.

Graduate Coordinator

Nachtigal, M.W.

Professors

Blay, J., BSc (Brad), PhD (Cantab). Cancer, tumour microenvironment, cell surface proteins, mass spectrometric analysis of drug metabolites

Downie, J.W., BSc, PhD (Man). Spinal cord, neurophysiology, neuropharmacology, autonomic nervous system, lower urinary tract sphincter, peripheral nerves, spinal cord injury, bladder inflammatory disease

Howlett, S.E., BSc (Concordia), MSc, PhD (Memorial). Cardiovascular pharmacology and electrophysiology, cardiac excitation-contraction coupling, heart disease

Kelly, M.E.M., BSc, PhD (Southampton). Ion channels, membrane transport, cell signaling, retinal neurobiology, ocular pharmacology

Renton, K.W., BSc (Sir Geo Wms), PhD (McGill). Drug metabolism, cytochrome P-450, drug interaction, CNS inflammation

Robertson, G.S., BSc, PhD, (Dal). Neurodegenerative disorders, apoptosis, gene therapy, inflammation, drug discovery, genetic disease models

Robertson, H.A., BA, MSc, (Western), PhD (Cantab). Immediate early genes, dopamine, molecular neurobiology, Parkinson's and Huntington's disease.

Sawynok, J., BSc, MSc (Melb), PhD (Queen's). Adenosoine, ATP, nociception, spinal cord, inflammation, caffeine

Associate Professors

Denovan-Wright, E.M., BSc, PhD (Dal). Molecular neurobiology, Huntington's Disease, gene expression.

Nachtigal, M., BSc, PhD (Manitoba). Ovarian cancer, cell signalling, TGF, molecular endocrinology

Sinal, C., BSc, Bioc (McMaster), PhD (UWO). Nuclear hormone receptor, cholesterol, liver, cholestasis, bile acid, gene regulation, atherosclerosis

Assistant Professors

Dupré, D.J., BSc, PhD (Sherbrooke)

Fawcett, J., BSc, MSc, MSc(T) (McMaster), PhD (McGill)

Pasumarthi, K.B.S, DVM (India), PhD (Manitoba). Cardiac regeneration, cell cycle, myocyte apoptosis, cell transplantation, embryonic stem cells, gene expression, cloning, gene transfer and transgenic mice.

Cross Appointments

Goralski, K., BSc (Hon) (Manitoba), PhD (Manitoba), Major Appointment in College of Pharmacy

Hung, O.R., BSc Pharm, MD (Dal) FRCP(C), Major Appointment in Department of Anesthesia

Peterson, T.C., BSc (SMU), MSc, PhD (Dal), Major Appointment in Department of Medicine

I. Admission Requirements

Candidates must satisfy the general requirements for admission to the Faculty of Graduate Studies.

Normally, a previous class in Biochemistry and in Physiology will be expected; however, applicants are advised to consult the department as to the appropriateness of their specific academic background. With departmental permission, specific classes in these subjects may be taken as part of a graduate program in Pharmacology.

II. Degree Programs

The following are the MINIMUM requirements for our graduate programs. Equivalencies may be granted for classes taken before entering our program. As indicated below, equivalency may also be granted for classes taken during the programs.

A. MSc Pharmacology

Candidates must satisfactorily complete the following classes or their equivalents: 5405.03, 5406.03, 5409.03, and a minimum of one (1) 5600 half-credit class or equivalent. A class in statistics may be required if an appropriate class has not been successfully completed before entrance to the program. This may be taken during the course of the graduate program. Students are expected to attend all research seminars within the department. Thesis research (9000.00) and preparation and oral defense of a thesis are required.

B. MSc Pharmacology/Neurosciences

Candidates must satisfactorily complete the following classes or their equivalents: 5405.03, 5406.03, 5409.03, one (1) 5600 half-credit class, NESC 6100.06 (full credit). A class in statistics may be required if an appropriate class has not been successfully completed before entrance to the program. This may be taken during the class of the graduate program. Students are expected to attend all research seminars within the department. Thesis research (9000.00) and preparation and oral defense of a thesis are required. Student Advisory Committees for this program must include an extradepartmental Neuroscientist faculty member.

C. PhD Pharmacology

Candidates must satisfactorily complete the class requirements listed for the MSc Pharmacology program, plus 5507.03, one (1) additional 5600 half-credit class or equivalent and one (1) half- credit ancillary class (extradepartmental). A class in statistics may be required if an appropriate class has not been successfully completed before entrance to the program. For students transferring from a MSc program to PhD program, a comprehensive examination (PHDP 8000.00) should occur before the end of their second year of their program. For students admitted directly to PhD program, a comprehensive examination (PHDP 8000.00) should occur within the first 12-18 months. Thesis research (9530.00) and preparation and oral defense of a thesis are required.

D. PhD Pharmacology/Neurosciences

Candidates must satisfactorily complete the class requirements listed for the MSc Pharmacology/Neurosciences program, plus 5507.03, two (2) additional 5600 classes or equivalents, and one (1) ½ credit ancillary class. (Note: Neurosciences 6100 may be counted as both a 5600 half-credit equivalent and as the half-credit ancillary class.) A class in statistics may be required if an appropriate class has not been successfully completed before entrance to the program. For students transferring from a MSc program to PhD program, a comprehensive examination (PHDP 8000.00) should occur before the end of their second year of their program. For students admitted directly to PhD program, a comprehensive examination (PHDP 8000.00) should occur within the first 12-18 months. Thesis research (9530.00) and preparation and oral defense of a thesis are required. Student Advisory Committees for this program must include an extradepartmental Neuroscientist faculty member.

III. Class Descriptions

PHAC 5405.03: Advanced Pharmacology.

This required class is a vehicle for graduate students to gain practical familiarity with research level concepts in receptor pharmacology. The main theme is analysis of receptor-mediated events, both in terms of the interaction of a drug at its binding site and in terms of the transduction of that initial signal. Both classical and modern molecular approaches will be

discussed. We will also consider related drug discovery strategies. The class has two sessions/week, one a didactic session to introduce concepts and the second a workshop session for discussion of practical assignments.
PREREQUISITE: Normally required PHAC 5406 and PHAC 5409 (Grade of B- or higher)

PHAC 5406.03: Introduction to Pharmacology I.

This introductory class is designed to acquaint students with the actions of drugs on physiological and biochemical functions in mammals including humans. Factors which affect the blood levels of drugs (absorption, distribution, metabolism, and elimination) will be considered, together with the mechanisms by which drugs act and their potential uses. The interaction of drugs with various body systems will be covered, including the central and peripheral nervous systems and the cardiovascular system. Drugs that assist or regulate host defence mechanisms will also be studied. Graduate students will also prepare a paper reviewing a selected drug.
COORDINATOR: S.E. Howlett
FORMAT: Lecture 3 hours
PREREQUISITE: A previous class in physiology and biochemistry is recommend. Extra readings may be required for students without these classes.
CROSS-LISTING: BIOL 4404.3, BIOC 4804.03, and NESC 4374.03

PHAC 5409.03: Introduction to Pharmacology II.

This class is intended to cover specific aspects of drug action not covered in PHAC 5406.03. The class includes: drug receptor signaling ion channels, second messengers, G-proteins, plus specific consideration of drugs used for pain, inflammation, cancer, diabetes, asthma, and diseases of the thyroid, eye and gastrointestinal tract. Special pharmacological topics including over-the-counter drugs, herbal medication, drug abuse, and industrial development of new drugs, plus a section on how drug actions and handling are altered in pregnancy, the elderly, and in children are included. Graduate students also will complete a research elective in a pharmacology research laboratory.
COORDINATOR: H.A. Robertson
FORMAT: Lecture 3 hours
PREREQUISITE: PHAC 5406.03 (with a grade of B or better) and instructor's consent
CROSS-LISTING: BIOL 4407.03, BIOC 4806.03, NESC 4376.03

PHAC 5507.03: PhD Lectures (2).

PHAC 5626.03/5627.03/5628.03: Special Topics in Pharmacology.

Students interested in topics not covered in formal classes may ask the department for special classes to meet their needs. The fields in which the department can offer instruction are reflected in the list of faculty research areas. Since different subjects may be covered each year, each class in the series has a separate number.
NOTE: Review and discussion of relevant literature recorded through a brief written summary. Additional written component encompassing either a term paper or grant proposal; formal departmental seminar. A written outline of the proposed course of study must be submitted for review prior to final approval.
FORMAT: Discussion/Lecture
PREREQUISITE: Enrollment as a Dalhousie graduate student in good standing with permission from the students Supervisory Committee and the Pharmacology Graduate Coordinator. Students from departments other than Pharmacology are eligible to be enrolled, but require permission from the Graduate Coordinator of their own home department as well as the Pharmacology Graduate Coordinator.

PHAC 9000.00: MSc Thesis.

PHAC 9530.00: PhD Thesis.

Offered in 2008-2009

PHAC 5603.03: Neuropharmacology of Pain. J. Sawynok
PHAC 5617.03: Molecular Therapeutic Strategies in Cancer Treatment. J. Blay
PHAC 5618.03: Pharmacology of Selected Cytokines and Growth Factors in Disease. T.C. Peterson
PHAC 5619.03: The Autonomic Nervous System and Its Control by the CNS. J.W. Downie
PHAC 5624.03: Advanced Topics in Molecular Neuropharmacology. E. Denovan-Wright

Offered in 2009-2010

PHAC 5606.03: Molecular Biology for Pharmacology. M. Nachtigal
PHAC 5609.03: Anatomical and Molecular Neuropharmacology of the Basal Ganglia: the Scientific Basis for Neural Transplantation. H.A. Robertson/I. Mendez/M. Hong
PHAC 5611.03: Cytochrome P450 Mediated Drug Metabolism. C.J. Sinal
PHAC 5612.03: Clinical Trials. J. Sawynok.
PHAC 5625.03: Electrophysiology and Ca^{2+} Imaging for Pharmacological Research Cardiac and Other Excitable Cells. S.E. Howlett

IV. Seminars

Students are required to attend a series of weekly seminars covering broad topics in pharmacology, with specialties encompassing neurobiology, cardiovascular biology, toxicology, cancer, and molecular and cellular biology.

Pharmacy

Location: Burbidge Building
5968 College Street
Halifax, NS B3H 3J5
Telephone: (902) 494-2378
Fax: (902) 494-1396
Website: www.dal.ca/Pharmacy

Director of College
Caldwell, R.K., BSc (Pharm), MHSA (Dal)

Graduate Coordinator
MacKinnon, N.J., BSc (Pharm), MS (Wisconsin), PhD (Florida)

Professors Emeriti
Duff, J.G., BSP, MSc (Sask), PhD (Fla)
Yung, D.K., BA, BSP, MSc (Sask), PhD (ALB)

Professors
Sketris, I.S., BSc (Pharm) (Toronto), PharmD (Minn), MPA (HSA) (Dal)
Yeung, P.K.F., BSc (Pharm), MSc (Man), PhD (Sask)

Associate Professors
Jurgens, T., BSc(Pharm), MSc (Dal), PhD (Miss)
Jakeman, D.L., BSc, PhD (Scheffield)
MacKinnon, N.J., BSc (Pharm), MS (Wisconsin), PhD (Florida)
Whelan, A.M., BSc(Pharm) (Dal), PharmD (MUSC)

Assistant Professor
Goralski, K., BSc (Biochem/Micro), PhD (Pharmacology and Therapeutics) (Manitoba)

There will be no new admission in 2008/2009 to the MSc and PhD in Pharmacy program.

Philosophy

Location: 6135 University Avenue
Halifax, NS B3H 4P9
Telephone: (902) 494-3810
Fax: (902) 494-3518
Email: dalphil@dal.ca
Website: www.philosophy.dal.ca

Chairperson of Department
Vinci, T.

Graduate Coordinator
Hymers, M.

Professors Emeriti
Braybrooke, D., BA (Harvard), MA, PhD (Cornell) FRSC. Political Philosophy

Campbell, R.M., BA (Harvard), PhD (Cornell), Munro Chair in Philosophy. Interests: Moral theory, epistemology, feminist theory, and philosophy of biology.

Professors
Baylis, F., BA (McGill), MA, PhD (Western), FRSC. Canada Research Chair in Bioethics and Philosophy, (Cross-appointment with the Faculty of Medicine) Interests: Bioethics and feminist ethics with a special interest in women's reproductive health, research involving women, novel technologies, stem cell research, part-human chimeras, and human cloning.

Brett, N.C., BA (New Hampshire), MA, PhD (Waterloo). Interests: Philosophy of law, ethics, modern philosophy.

Campbell, S., BA, MA (Alberta), PhD (Toronto). Interests: Moral and political phychology, feminist theory, ethics.

Schotch, P.K., PhD (Waterloo). Interests: Philosophy of logic and its applications to economic and moral philosophy.

Sherwin, S.B., BA (York), PhD (Stanford), FRSC, University Research Professor. Interests: Feminist theory, bioethics, ethics.

Vinci, T., BA (Toronto), PhD (Pittsburgh). Interests: Epistemology, philosophy of science, history of modern philosophy, decision theory.

Associate Professors
Glazebrook, P., BA (Alberta), MA, PhD (Toronto). Interests: Environmental Philosophy, philosophy of science, Heidegger.

Hymers, M. BSc, MA (Dalhousie), PhD (Alberta). Interests: Epistemology, Philosophy of language, Wittgenstein.

MacIntosh, D., BA (Hons) (Queens), MA (Waterloo), PhD (Toronto). Interests: Philosophy of language and science, meta-ethics, decision theory, action theory, metaphysics.

Assistant Professors
Abramson, D., BA(Hons) (Toronto), MSc., PhD, (Indiana). Interests: Philosophy of computing, philosophy of cognitive science, and philosophy of mind.

Meynell, L., BA (Hons) (York), MA (Calgary), PhD (Western).Interests: Epistemology, feminist philosophy, philosophy of science, aesthetics.

Scherkoske, G., BA(Hons) (Clark), MA (Simon Fraser and California), PhD (Cambridge). Interests: Moral and political philosophy, practical reasoning and history of philosophy.

Adjunct Professors
Barresi, J., BS (Brown), MA (Southern California), MS, PhD (Wisconsin)
Burns, S.A.M., BA (Hons) (Acadia), MA (Alberta), PhD (London)
Kernohan, A., MA (Dalhousie), PhD (Toronto). Political Philosophy
Maitzen, S.A., BA (Northwestern), MA, PhD (Cornell)
Nieman, M., BJ (Carleton), MA (Toronto), PhD (Queen's)

Schellenberg, J., BA, MA (Calgary), DPhil (Oxford)
Watkins, M., BA, MA (Tennessee), PhD (Ohio State)
Wein, S., BA Hons., MA, PhD. (Waterloo)

Each student's program is arranged individually in consultation with the department in relation to the student's interests and preparation. Enquiries should be addressed to the Graduate Studies Coordinator in the Department.

I. Admission Requirements

Candidates must satisfy the general requirements for admission to the Faculty of Graduate Studies.

II. Degree Programs

A. Master of Arts (MA)

One Year

For students with an Honours BA or equivalent in philosophy. Requirements include six half-credit classes (of which at least three are Seminar Classes) and a thesis.

Two Year

For those with an honours degree in a related field. Requirements include eight half-credit classes in the first year, six half-credit classes (of which at least three are Seminar Classes) in the second year, and a thesis.

Part-Time

A part-time MA over a longer period is available for fully qualified students.

B. Doctor of Philosophy (PhD)

For students with an MA in philosophy.
For minimum time required to complete this program, see the Faculty of Graduate Studies regulations. Doctoral students are required to take six half-year classes (eighteen credit hours), including at least four Seminars (see "Class Descriptions" below) beyond the requirements for the MA. The program includes comprehensive examinations in the 2nd year. Reading knowledge will usually be required in one language other than English in which a significant body of philosophical literature exists. Completion of the program requires original research on a project of substantial dimensions, culminating in the submission and oral defence of a thesis. This research should be in an area already well-established as a specialty by members of the department, such as, epistemology, ethics, bioethics, philosophy of mind, feminist philosophy, political and social philosophy, philosophy of language, or logic. Doctoral students are expected to present two papers at Departmental colloquia as part of their program of studies.

III. Class Descriptions

The Philosophy Department offers three kinds of graduate classes: General, Seminar, and Directed Study. *General* classes survey a wide range of topics and are designed to acquaint students with the major theories and developments in a field. They are suitable for those who have not specialized in the field as an undergraduate. *Seminar* classes, which assume some previous exposure to the subject, are central to the graduate program. Students in the MA program must take a minimum of three half-year seminar classes (9 credit hours) as part of their total (18 credit-hours). Students in the PhD program must take at least four half-year seminar classes (12 credit-hours) as part of their total (18 credit-hours). These Seminars are designed to deepen the student's understanding of an area by focusing on a specific theme or problem. *Directed Study* classes are developed jointly by a student and the instructor in special cases to suit individual interests and needs. For example, a student with no previous training in modern symbolic logic would complete a directed study class. This may include attending a class that provides a comprehensive introduction to the subject and completing some additional work. These classes are subject to departmental approval.

NOTE: The classes listed are half-year, unless otherwise indicated, and not all are given in any one year. Instructors in seminar classes are likely to vary from year to year. Consult the department for further information.

General Classes

PHIL 5051.03: Theory of Knowledge.

A study of fundamental issues in the theory of knowledge. The class examines skepticism, and investigates the nature of knowledge, belief, meaning, evidence, and truth. Questions are raised about perception and memory and their relation to knowledge as are questions about our knowledge of ourselves and other people.
INSTRUCTOR(S): D. MacIntosh, T. Vinci, M. Hymers
FORMAT: Lecture/discussion
CROSS-LISTING: PHIL 3051.03

PHIL 5105.03: Ethics.

A systematic study of the foundation of morality, including readings from central sources in both classical and contemporary moral theory.
INSTRUCTOR(S): D. MacIntosh, G. Scherkoske
FORMAT: Lecture/discussion
CROSS-LISTING: PHIL 3105.03
EXCLUSION: PHIL 3100.06

PHIL 5140.03: Logic: Logical Theory 1.

An introduction to metalogic, with special attention to the soundness and completeness of formal systems, and to the philosophical evaluation of non-classical logics.
INSTRUCTOR(S): P.K. Schotch
FORMAT: Lecture/discussion
PREREQUISITE: PHIL 2130.03 or equivalent
CROSS-LISTING: PHIL 3140.03

PHIL 5165.03: Logic: Logical Theory II.

Devoted primarily to the study of formal semantics and its relation to symbolic language.
INSTRUCTOR(S): P.K. Schotch
FORMAT: Lecture/discussion
PREREQUISITE: PHIL 2130.03, PHIL 2140.03, PHIL 3140.03 or permission of the instructor
CROSS-LISTING: PHIL 3165.03

PHIL 5170.03: Contemporary Feminist Theories.

Contemporary feminism is not a single theory but comprises multiple theoretical perspectives, reflecting both a diversity in women's experience of subordination and a diversity of interests and approaches. This class aims to present some of the richness and variety in feminist theory while offering students the opportunity for sustained critical engagement with influential feminist thinkers.
INSTRUCTOR(S): S. Campbell
FORMAT: Lecture/discussion
CROSS-LISTING: GWST 3500.03, PHIL 3170.03

PHIL 5211.03: Philosophy of Law.

Is coercion central to law? How are law and morality related? What justification can be given for punishment? What is the appropriate scope of individual liberty? These and other issues relating to the analysis and evaluation of law will be considered. The class will examine the competing claims of the Positivist, Realist, and Natural Law accounts of law before turning to some normative issues concerning the justification of legal practice.
INSTRUCTOR(S): N. Brett
FORMAT: Lecture/discussion
CROSS-LISTING: PHIL 3211.03

PHIL 5300.03: Philosophy of Language.

What does it mean to say that the elements of language have meaning?
INSTRUCTOR(S): D. MacIntosh, M. Hymers
FORMAT: Lecture/discussion
PREREQUISITE: Two previous classes in Philosophy including one logic class, half or full-year
CROSS-LISTING: PHIL 3300.03

PHIL 5420.03: Philosophy of Biology.

This class provides an up-to-date examination of the central issues in the philosophy of biology. Topics include: How far can the Darwinian paradigm be taken to explain adaptive complexity? Is the new emphasis on developmental theory likely to revolutionize evolutionary theory? What are the most fundamental units of selection? Can the concept of biological function be understood without attributing purpose to nature? Why is the concept of species so elusive? Is there a human nature? Is genuine altruism possible given the forces of selection? Is there progress in evolution? How should clashes between faith and reason over the nature of our evolution be resolved?
INSTRUCTOR(S): L. Meynell
FORMAT: Lecture/discussion
CROSS-LISTING: BIOL 3580.03, PHIL 3420.03

PHIL 5445.03: Philosophy of Mind: The Mind-Body Problem.

This class will critically examine philosophical and scientific articles, and possibly short works of fiction, which explore various theories, problems and arguments regarding the status of minds in the physical world and the relationships between mind, body and world. We will explore and discuss controversies regarding the thesis that the mind is (nothing but?) the brain, and issues such as the theoretical foundations of artificial intelligence, the problem of subjectivity and consciousness, "naturalized" intentionality (how thoughts--if they are physical things or processes-- can have the property of being about other things), and animal cognition.
INSTRUCTOR(S): D. Abramson
FORMAT: Lecture/discussion
PREREQUISITE: Two previous classes in philosophy
CROSS-LISTING: PHIL 3445.03
EXCLUSION: PHIL 5440.03

PHIL 5450.03: Philosophy of Emotions.

We will concentrate on the resurgence of philosophical interest in the emotions over the last twenty years. Although it is obvious that much human action is emotionally driven, traditionally many philosophers have expressed skepticism about the value of emotions to rational and ethical conduct. Recently, philosophers such as Martha Nussbaum, Amelie Rorty and Ronald De Sousa have argued that rationality requires emotions. Other philosophers have argued that we need a renewed assessment of the epistemic importance of emotion in revealing power and value. Topics will include emotional rationality; emotion and value; first person authority; cognitive, social constructivist and psycho-evolutionary approaches; emotion and feminist epistemology; emotion, power and racial construction.
INSTRUCTOR(S): S. Campbell
FORMAT: Lecture/discussion
PREREQUISITE: Two previous classes in Philosophy
CROSS-LISTING: PHIL 3450

PHIL 5455.03: Philosophy of Mind: Personal Identity.

A systematic study of theories of personal identity. We will look not only at classic analytic thought experiments about identity in authors like Bernard Williams and Derek Parfit, but also at literary treatments of metamorphosis and at political texts that call upon persons to undertake identity shifts. Our interest will be in what these texts indicate about the nature of personal continuity from within a view of persons as socially constituted.
INSTRUCTOR(S): S. Campbell
FORMAT: Lecture/discussion
PREREQUISITE: Two previous classes in philosophy
CROSS-LISTING: PHIL 3455.03
EXCLUSION: PHIL 5440.03

PHIL 5530.03: Freedom, Action, and Responsibility.

An investigation of the nature of action, seeking criteria for individuating, describing, and explaining actions. Topics may include the roles of volitions, intentions, motives, and reasons in actions; responsibility for actions and the concept of free action.
INSTRUCTOR(S): P.K. Schotch, D. MacIntosh
FORMAT: Lecture/discussion
CROSS-LISTING: PHIL 3530.03

PHIL 5630.03: History of Philosophy: Kant.

In this class we study Kant's theoretical philosophy, centering on the two editions of the Critique of Pure Reason, the Prolegomena and some of the earlier writings, including the 1768 (pre-critical) writing, Regions of Space.
INSTRUCTOR(S): T. Vinci
FORMAT: Lecture/discussion
CROSS-LISTING: PHIL 3630.03

PHIL 5635.03: History of Philosophy: 19th-Century Philosophy.

This class will study the major figures in 19th-century philosophy between Kant and Russell: Fichte, Hegel, Schopenhauer, Marx, Kierkegaard, Mill, Nietzsche, James and Bradley. Attention will also be paid to some important figures in related arts and sciences (e.g., Beethoven, Wagner, Ibsen, Feuerbach, Darwin, Freud, Wollstonecraft, Frege). We shall trace the main lines of development in epistemology and metaphysics as well as in ethics and political philosophy.
INSTRUCTOR(S): Staff
FORMAT: Lecture/discussion
CROSS-LISTING: PHIL 3635.03

PHIL 5640.03: History of Philosophy: Twentieth-Century Philosophy.

The Twentieth Century has been a period of revolutionary change in Anglophone philosophy. This class surveys the most influential figures, including Wittgenstein, Quine, Moore and Austin.
INSTRUCTOR(S): D. MacIntosh
FORMAT: Lecture/discussion
CROSS-LISTING: PHIL 3640.03

PHIL 5650.03: Modern Philosophy.

"Modern Philosophy" refers to a philosophical perspective that arose during the great advances of Western science in the 17th and 18th centuries. Modern Philosophy seeks to advance the thesis that persons are beings with conscious thoughts (ideas) and that all of the interesting forms of contact people have with the world - perceptual, semantic, epistemic, casual - are mediated by conscious thoughts. Modern Philosophy also seeks to reconcile this thesis with the scientific/materialistic image of the world then emerging. This class involves a study of the systematic properties of this perspective employing both historical primary sources and contemporary commentary. (This class is designed to complement PHIL 5660.03 but can be taken independently.)
INSTRUCTOR(S): T. Vinci
FORMAT: Lecture/discussion
CROSS-LISTING: PHIL 3650.03

PHIL 5660.03: Postmodern Philosophy.

Modern philosophy is a philosophical perspective in which individuals and their conscious thoughts are paramount. Postmodern philosophy rejects this perspective, replacing it with one in which language and society are paramount. We shall study this perspective in the writings of post-Wittgenstein philosophers like Rorty in the English-speaking world as well as those like Derrida , Irigaray and Habermas on the Continent.
INSTRUCTOR(S): M. Hymers, P. Glazebrook
FORMAT: Lecture/discussion
CROSS-LISTING: PHIL 3660.03

PHIL 5670.03: Philosophy of Science.

The nature of science, scientific inquiry, scientific explanation, and scientific theories are explored with particular attention to key episodes in 20th Century philosophy of science. No scientific background is presupposed.
INSTRUCTOR(S): D. MacIntosh, T. Vinci, L. Meynell
FORMAT: Lecture/discussion
PREREQUISITE: At least two previous classes in philosophy, including one half-or full-year logic class such as PHIL 2660.03
CROSS-LISTING: PHIL 3670.03

PHIL 5851.03: Metaphysics.
A study of topics such as the nature of substance and change, body and mind, cause and effect, and the concept of existence.
INSTRUCTOR(S): M. Hymers, T. Vinci
FORMAT: Lecture/discussion
CROSS-LISTING: PHIL 3851.03

Seminar Classes

PHIL 5055.03: Topics in Epistemology.
In this seminar class, students focus on a particular topic in epistemology and investigate it in detail. When the class is offered, the topic is assigned by the Department at the end of the preceding academic year and is then posted at the Department and in the Faculty's timetable on the Web.
INSTRUCTOR(S): M. Hymers
FORMAT: Seminar
CROSS-LISTING: PHIL4055.03

PHIL 5070.03: Topics in Philosophical Psychology.
INSTRUCTOR(S): S. Campbell, D. Abramson
FORMAT: Seminar
CROSS-LISTING: PHIL 4070.03

PHIL 5080.03: Topics in Logical Theory.
INSTRUCTOR(S): P.K. Schotch
FORMAT: Seminar
CROSS-LISTING: PHIL 4080.03

PHIL 5115.03: Topics in Ethics I.
In this seminar class, students focus on a particular topic in ethical theory and investigate it in detail. When the class is offered, the topic is assigned by the Department at the end of the preceding academic year and is then posted at the Department and in the Faculty's timetable on the Web.
INSTRUCTOR(S): G. Scherkoske
FORMAT: Seminar
CROSS-LISTING: PHIL 4115.03

PHIL 5120.03: Theory of Rational Decision.
A study of foundational problems in contemporary theory of rational decision and its philosophical applications, drawing on work by philosophers, psychologists, economists and mathematicians.
INSTRUCTOR(S): D. MacIntosh
FORMAT: Seminar
CROSS-LISTING: PHIL 4120.03

PHIL 5125.03: Topics in Ethics II.
INSTRUCTOR(S): G. Scherkoske

PHIL 5190.03: Topics in the History of Philosophy I.
In this seminar class, students focus on a particular topic in the History of Philosophy and investigate it in detail. When the class is offered, the topic is assigned by the Department at the end of the preceding academic year and is then posted at the Department and in the Faculty's timetable on the Web.
INSTRUCTOR(S): M. Hymers
FORMAT: Seminar
CROSS-LISTING: PHIL 4190.03

PHIL 5191.03: Topics in the History of Philosophy II.
In this seminar class, students focus on a particular topic in Modern Philosophy (e.g., the work of Descartes or Spinoza) and investigate it in detail. When the class is offered, the topic is assigned by the Department at the end of the preceding academic year and is then posted at the Department and in the Faculty's timetable on the Web.
INSTRUCTOR(S): M. Hymers
FORMAT: Seminar
CROSS-LISTING: PHIL 4191.03

PHIL 5192.03: Topics in the History of Philosophy III.
In this seminar class, students focus on a particular topic in Modern Philosophy (e.g., the work of Locke or Hume) and investigate it in detail. When the class is offered, the topic is assigned by the Department at the end of the preceding academic year and is then posted at the Department and in the Faculty's timetable on the Web.
INSTRUCTOR(S): N. Brett
FORMAT: Seminar
CROSS-LISTING: PHIL 4192.03

PHIL 5200.03: Topics in Normative Theory.
In this seminar class, students focus on a particular topic in Normative Theory (e.g. Environmental Justice, Meta-Ethics, Peace and War, Evolutionary Ethics) and investigate it in detail. When the class is offered, the topic is assigned by the Department at the end of the preceding academic year and is then posted at the Department and in the Faculty's timetable on the Web.
INSTRUCTOR(S): P. Glazebrook, G. Scherkoske, N. Brett
FORMAT: Seminar
CROSS-LISTING: PHIL 4200.03

PHIL 5215.03: Topics in Philosophy of Law.
In this seminar class, students focus on a particular topic in the Philosophy of Law and investigate it in detail. When the class is offered, the topic is assigned by the Department at the end of the preceding academic year and is then posted at the Department and in the Faculty's timetable on the Web.
INSTRUCTOR(S): N. Brett
FORMAT: Seminar
CROSS-LISTING: PHIL 4215.03

PHIL 5220.03: Contemporary Philosophical Issues.
Intensive study of a few topics which are currently being debated and may fall outside of or cut across standard classification of areas of interest. Examples are: evolution and value, philosophical accounts of "race" and culture, artificial intelligence, theories of causation, supervenience.
INSTRUCTOR(S): S. Campbell
FORMAT: Seminar
CROSS-LISTING: PHIL 4220.03

PHIL 5470.03: Contemporary Liberalism and Democracy.
Liberalism takes a variety of forms and includes many topics including the rule of law, limited government, the free exchange of goods, entitlement to property, the self, and individual rights. Its philosophical and political assumptions provide the intellectual context within which its account of the individual, its vision of the community and its preferred allocation of resources will be assessed.
INSTRUCTOR(S): N. Brett, G. Scherkoske
FORMAT: Seminar
CROSS-LISTING: POLI 4479.03/5479.03, ECON 4446.03/5446.03, PHIL 4470.03

PHIL5476.03: Liberalism and Global Justice.
This is a course in normative political theory. We will critically examine some recent normative political theory, and then examine the prospects and perils of attempts by recent liberal theory to articulate a principled vision of global justice. We will consider Rawls' original bounded theory of justice and examine some challenges it faces from both cosmopolitan theories of justice and proponents of nationalism. Next we'll consider rival political conceptions of liberal international justice, and Rawls' response in the form of his recent The Law of Peoples. Concluding, we well examine specific issues of applied political justice (namely, human rights and immigration) as well as issues of economic and social justice and poverty.
INSTRUCTOR: G. Scherkoske
FORMAT: Lecture/ Discussion
PREREQUISITES: 2 courses in Philosophy or Political Science or permission of instructor
CROSS-LISTINGS: PHIL3476.03, POLI 3476.03

PHIL 5480.03: Social Choice Theory.
Arrow's theorem brings together the theory of voting and welfare economics, seemingly leading both (and the theory of democracy as well) to ruin. This class will consider how to cope with the problem.
INSTRUCTOR(S): P.K. Schotch
FORMAT: Seminar
CROSS-LISTING: POLI 5480.03, ECON 5448.03

PHIL 5500.03: Topics in Feminist Philosophy.

In this class we shall explore some of the current research in a focused area of feminist philosophy. Previous topics have included feminist ethics, feminist epistemology, postmodern feminism, the feminist sexuality debates, and ecofeminism.
INSTRUCTOR(S): S. Campbell, P. Glazebrook, L. Meynell
FORMAT: Seminar
CROSS-LISTING: GWST 5500.03

PHIL 5510.03: Topics in Philosophy of Language.

In this seminar class, students focus on a particular topic in the Philosophy of Language and investigate it in detail. When the class is offered, the topic is assigned by the Department at the end of the preceding academic year and is then posted at the Department and in the Faculty's timetable on the Web.
INSTRUCTOR(S): M. Hymers
FORMAT: Seminar
CROSS-LISTING: PHIL 4510.03

PHIL 5680.03: Topics in the Philosophy of Science.

In this seminar class, students focus on a particular topic in the Philosophy of Science and investigate it in detail. When the class is offered, the topic is assigned by the Department at the end of the preceding academic year and is then posted at the Department and in the Faculty's timetable on the Web.
INSTRUCTOR(S): T. Vinci, L. Meynell
FORMAT: Seminar
CROSS-LISTING: PHIL 4680.03

PHIL 5801.03: Topics in Ethics and Health Care.

In this seminar class, students focus on a particular topic in Ethics and Health Care and investigate it in detail. When the class is offered, the topic is assigned by the Department at the end of the preceding academic year and is then posted at the Department and in the Faculty's timetable on the Web
INSTRUCTOR(S): Staff
FORMAT: Seminar
PREREQUISITE: Graduate student or permission of the instructor.
CROSS-LISTING: PHIL4801.03, BIOT5801.03

PHIL 5855.03: Topics in Metaphysics.

In this seminar class, students focus on a particular topic in Metaphysics and investigate it in detail. When the class is offered, the topic is assigned by the Department at the end of the preceding academic year and is then posted at the Department and in the Faculty's timetable on the Web.
INSTRUCTOR(S): D. MacIntosh
FORMAT: Seminar
CROSS-LISTING: PHIL 4855.03

PHIL5960.03/5980.03; 5970X/Y.06/5990X/Y.06: Directed Study Class.

PHIL 9000.00: MA Thesis.

PHIL 9530.00: PhD Thesis.

Physics and Atmospheric Science

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Coordinator, Atmospheric Science

Drummond, J.R. (494 2324)

Professors Emeriti

Betts, D.D., BSc, MSc (Dalhousie), PhD (McGill), FRSC - Research
Jericho, M.H., BSc, MSc (Dalhousie), PhD (Cantab), FRSC
Stroink, G, BSc, MSc (Delft), PhD (McGill), PEng, cross appointment with the School of Biomedical Engineering

Professors

Dahn, J.R., BSc (Dalhousie), MSc, PhD (UBC), FRSC, NSERC/3M Canada Inc. Industrial Research Chair, Canada Research Chair in Materials for Batteries and Fuel Cells, cross appointment with Chemistry
Drummond, J.R., BA, MA, PhD (Oxford), FRSC-Canada Research Chair, Remote Sounding of Atmospheres
Dunlap, R.A., BS (Worcester), AM (Dartmouth), PhD (Clark)
Geldart, D.J.W., BSc (Acadia), PhD (McMaster), FRSC - Research
Greatbatch, R., BSc (Liverpool), PhD (Cambridge), NSERC/MARTEC/AES Research (Chair), primary appointment with Oceanography
Kreuzer, H.J., MSc, DSc (Bonn), FRSC - A.C. Fales Professor of Theoretical Physics
Rotermund, H.H., PhD (Berlin), George Munro Professor of Physics
White, M.A., BSc (UWO), PhD (McMaster), University Research Professor, primary appointment with Chemistry
Zwanziger, J., W., BA (Chicago), PhD (Cornell), Canada Research Chair in NMR Studies of Materials, primary appointment with Chemistry

Associate Professors

Duck, T., BSc, PhD (York)
Folkins, I., BSc (Dalhousie), MSc, PhD (Toronto), cross appointment with Oceanography
Hewitt, K., BSc (Toronto), PhD (Simon Fraser), P.PHYS
Hill, I.G., BSc, PhD (Queen's)
Kyriakidis, J., BSc, MSc (Dalhousie), PhD (Basel)
Lesins, G.B., PhD (Toronto), Research
Labrie, D., BSc (Montreal), MSc, PhD (McMaster)
Maksym, G.N., PhD (McGill), primary appointment in the School of Biomedical Engineering
Martin, R.V., BS (Cornell), MS, PhD (Harvard), cross appointment with Environmental Programs, Chemistry
Rutenberg, A.D., BSc (Toronto), PhD (Princeton)
Tindall, D.A., BA, PhD (Cantab)

Assistant Professors

Bonev, S.A., MSc (Dalhousie), PhD (Cornell)
Hale, M., PhD (UNB), primary appointment with Radiation Oncology, Dalhousie

Hall, K.C., MSc, PhD (Toronto), (NSERC University Faculty Award)
Kreplak, L., MSc (Supelec), PhD (Univ. Paris XI)
Monchesky, T., BASc (Toronto), PhD (Simon Fraser)
Robar, J., MSc (McGill) PhD, (UBC), primary appointment with Radiation Oncology.
Wells, S.M., BSc (Western), PhD (Toronto), (NSERC University Faculty Award)

Adjunct Professors

Austin, R., PhD (McMaster), Astronomy and Physics, SMU
Azzouz, M. PhD (J.F., France), Physics & Astronomy, Laurentian University
Barkanova, S., PhD (U of Manitoba), Acadia U.
Bennett, C., PhD (Waterloo), Physics, Acadia U.
Beyea, S., PhD (UNB), National Research Council of Canada
Bowen, C., PhD (UWO) Institute for Biodiagnostics, NRC
Butler, M., PhD (Caltech), Astronomy and Physics, SMU
Chyek, P., PhD (U of Cal), LANL
Hornridge, D., PhD (U of Saskatchewan) Physics, Mount Allison
Lohmann, U., PhD (Hamburg) ETH Zurich, Switzerland
Purcell, C., PhD (Dalhousie), Defence Research and Development Canada
Ritchie, H.C., MSc, PhD (McGill), Meteorological Service of Canada-Atlantic5
Robertson, M., PhD (Waterloo), Physics, Acadia U.
Sarty, A., PhD (U of Saskatchewan), Astronomy and Physics, SMU

Postdoctoral Fellows/Research Associates

Bayinder, Z., PhD (Clark University)
Garsuch, A., PhD (Leipzig)
Garsuch, R., PhD (Leipzig)
Hatchard, T., PhD (Dalhousie)
Lamsal, L., PhD (Universität Bremen)
Payne, S.H., PhD (Cantab)
Stevens, D., PhD (Dalhousie)
Sudiarta, W., PhD (Dalhousie)
Wang, R.L., PhD (Dalhousie)
Westreich, P., PhD (Simon Fraser)
Yang, R., PhD (CAS, Beijing)
Zhao, F., PhD (University of Science & Technology of China)

I. Introduction

The Department of Physics and Atmospheric Science offers both masters and doctoral degree programs. Research in the department has an interdisciplinary approach with major activities in: Atmospheric Science, Biophysics, Condensed Matter Physics, Materials Science, Surface Science, Photonics, and Computational Physics and involves collaborations with other units such as Biomedical Engineering, Chemistry, Mathematics, Medicine, and Oceanography, as well as government and industrial laboratories. Research facilities include a large array of sample preparation and analytical tools as well as extensive computational facilities.

The most up-to-date information about our graduate programs, admission requirements, academic regulations, graduate classes and research activities is available at our Website: http://www.physics.dal.ca

II. Admission Requirements

Candidates must satisfy the general requirements for admission to the Faculty of Graduate Studies. An MSc is the normal admission requirement for the PhD program. It is recommended that all international students provide the Department with an official copy of the Advanced Graduate Record Examination in Physics. In some cases this will be made a precondition to consideration of the student's application for admission.

III. Degree Programs

A. Master of Science (MSc)

For minimum time required to complete this program, see the Faculty of Graduate Studies regulations in this calendar.

At least two full credit classes are normally required.

Research, preparation, and oral defense of a thesis are required.

B. Doctor of Philosophy (PhD)

For minimum time required to complete this program, see the Faculty of Graduate Studies regulations in this calendar.

At least two full credit classes are normally required and additional classes may be specified by supervisory committees.

A preliminary oral examination must be completed successfully.

Research and the preparation and oral defense of a thesis are required.

The PhD degree will be granted primarily on the basis of the candidate's ability to carry through original investigation. Part of the evidence of this will be acceptance of scientific material for publication in refereed journals and the preparation of a satisfactory thesis.

IV. Class Descriptions

5000-level classes are fourth-year undergraduate classes which may be taken for graduate credit in certain circumstances. They are normally taken by new graduate students having background deficiencies in specific areas. 6000-level classes are full graduate classes.

All graduate students are required to attend and participate in regular departmental seminars.

A selection of the following graduate classes will be offered subject to demand.

PHYC 5100.03: Electromagnetism.

Topics will normally include electrostatics and magnetostatics, boundary value problems, fields in matter, time-dependent phenomena. Maxwell's equations, electromagnetic waves, radiation.
FORMAT: Lecture 3 hours
PREREQUISITE: PHYC 2510.03, 4160.03; MATH 3110.03/3120.03; or the permission of the instructor

PHYC 5151.03: Quantum Physics II.

This class is a continuation of PHYC 3640.03. Topics include: time-independent perturbation theory, the variational principle, the WKB approximation, time-dependent perturbation theory, scattering, Born approximation.
PREREQUISITE: PHYC 3640.03

PHYC 5152.03: Quantum Physics III.

Topics covered can include scattering theory, symmetries, relativistic quantum mechanics, second quantization, many-body systems and quantum applications in materials science.
FORMAT: Lecture 3 hours
PREREQUISITE: PHYC 5151.03

PHYC 5160.03: Mathematical Methods of Physics.

Topics discussed include: complex variable theory, Fourier and Laplace transform techniques, special functions, partial differential equations.
FORMAT: Lecture 3 hours
PREREQUISITE: PHYC 2140.03, MATH 3120.03 or permission of the instructor

PHYC 5170.03: Topics in Mathematical Physics.

This class is a continuation of PHYC 5160.03 and deals with special topics in mathematical physics selected from areas such as the Green's function technique for solving ordinary and partial differential equations, scattering theory and phase shift analysis, diffraction theory, group theory, tensor analysis, and general relativity.
FORMAT: Lecture 3 hours
PREREQUISITE: PHYC 5160.03, or permission of the instructor

PHYC 5180.03: Nuclear and Particle Physics.

This is an introductory class in nuclear physics. Topics discussed include: nucleon-nucleon interactions, nuclear structure, gamma transitions, alpha decay, beta decay, nuclear reactions and elementary particle physics.
FORMAT: Lecture 3 hours
PREREQUISITE: PHYC 3640.03 or permission of the instructor

PHYC 5220.03: Microcomputer Based Instrumentation.

Subject material: instrument design, analog to digital and digital to analog techniques, custom interfacing to sensors, algorithms, parallel and serial output data links, software testing and debugging, hardware testing and debugging, research project.
FORMAT: Lecture 3 hours
PREREQUISITE: PHYC 3810.03 or permission of the instructor

PHYC 5230.03: Introduction to Solid State Physics.

An introduction to the basic concepts of solid state physics which are related to the periodic nature of the crystalline lattice. Topics include crystal structure, X-ray diffraction, phonons and lattice vibrations, the free electron theory of metals, and energy bands.
FORMAT: Lecture 3 hours
PREREQUISITE: PHYC 3640.03, PHYC 3210.03, or permission of the instructor

PHYC 5311.03: Fluid Dynamics.

An introduction to the theory of fluid dynamics with some emphasis on geophysically important aspects. Topics include kinematics, equations of motion, viscous flow, potential flow and basic aerodynamics.
FORMAT: Lecture 3 hours
PREREQUISITE: Permission of the instructor
CROSS-LISTING: OCEA 5311.03

PHYC 5330.03: Crystallography and Physical Properties.

The class covers an introduction to space groups, single crystal diffraction, powder x-ray and neutron diffraction as well as Rietveld profile refinement methods. The impact of structure on physical properties of solids will be examined. There will be hands-on experimental activities in addition to lectures.
FORMAT: Lecture 3 hours
PREREQUISITE: PHYC 3140.03 or permission of the instructor

PHYC 5411.03: Atmospheric Dynamics I.

The basic laws of fluid dynamics are applied to studies of atmospheric motion, including the atmospheric boundary layer and synoptic scale weather disturbances (the familiar highs and lows on weather maps). Emphasis will be placed on the blend of mathematical theory and physical reasoning which leads to the best understanding of the dominant physical mechanisms.
FORMAT: Lecture 3 hours
PREREQUISITE: Permission of the instructor
CROSS-LISTING: OCEA 5411.03

PHYC 5412.03: Atmospheric Dynamics II.

The approach is the same as for PHYC 5411.03, with emphasis on synoptic-scale wave phenomena, frontal motions, and the global circulation. Additional topics including tropical meteorology, middle atmospheric dynamics, severe storms, mesoscale meteorology and numerical weather prediction may be included.
FORMAT: Lecture 3 hours
PREREQUISITE: PHYC 5411.03, or permission of the instructor
CROSS-LISTING: OCEA 5412.03

PHYC 5500.03: Atmospheric Physics I.

The first part of the class deals with an overview of classical thermodynamics and its application to the atmosphere where the role of water in all its phases is emphasized. The second part of the class is on the solar and terrestrial components of atmospheric radiative transfer.
FORMAT: Lecture 3 hours
PREREQUISITE: At least one 3rd year physics class, preferably thermodynamics, or permission of the instructor
CROSS-LISTING: OCEA 5500.03

PHYC 5510.03: Atmospheric Physics II.

The major topics covered in this class are the physics of clouds and storms. Other topics include aerosol physics, lightning and radar techniques. Other topics are covered at the discretion of the instructor.
FORMAT: Lecture 3 hours
PREREQUISITE: PHYC 4500.03, or permission of the instructor
CROSS-LISTING: OCEA 5510.03

PHYC 5520.03: Introduction to Atmospheric Science.

This general overview of the atmosphere provides the student with an understanding of the composition and thermal structure of the atmosphere, air mass and frontal theory and weather generating physical processes and their consequences. Other topics include atmospheric radiation, dynamic meteorology, climatology and the physics of clouds and storms.
FORMAT: Lecture 3 hours
PREREQUISITE: At least one 3rd year physics class or permission of the instructor
CROSS-LISTING: OCEA 5520.03

PHYC 5540.03: Synoptic Meteorology I.

This class introduces the practical skills of meteorological observation and analysis. Emphasis is on developing skills in drawing and interpreting weather maps, and on studying the three-dimensional structure of weather systems. Satellite and radar remote sensing of the atmosphere is also introduced. Case studies of atmospheric systems and processes are carried out during the tutorial-laboratory period.
FORMAT: Lecture 2 hours, tutorial-lab 3 hours
PREREQUISITE: At least 1 third-year physics class
CROSS-LISTING: OCEA 5541.03, PHYC 4540.03

PHYC 5550.03: Synoptic Meteorology II.

This class extends the analysis and diagnosis of atmospheric dynamics and weather processes introduced in PHYC 4540.03. Emphasis is on the practical application of meteorological theory, particularly in the area of diagnosing the cases of weather events. Modern computer and statistical methods are discussed, and students receive an introduction to weather forecasting.
FORMAT: Lecture 2 hours, tutorial-lab 3 hours
PREREQUISITE: PHYC 5540.03
CROSS-LISTING: OCEA 5550.03, PHYC 4550.03

PHYC 5570.03: Light Scattering, Radiative Transfer, and Remote Sensing.

The equations of radiative transfer are developed and applied to the interaction of solar and terrestrial radiation with molecules, aerosols, and clouds in the atmosphere. Emphasized topics include satellite remote sensing, scattering and absorption, and the Earth radiation budget.
CROSS-LISTING: OCEA 5570.03

PHYC 5595.03: Atmospheric Chemistry.

A fundamental introduction to the physical and chemical processes determining the composition of the atmosphere and its implications for climate, ecosystems, and human welfare. Origin of the atmosphere. Nitrogen, oxygen, carbon, sulfur cycles. Climate and the greenhouse effect. Atmospheric transport and turbulence. Stratospheric ozone. Oxidizing power of the atmosphere. Regional air pollution: aerosols, smog, acid rain.
INSTRUCTOR(S): R. Martin
FORMAT: Lecture
CROSS-LISTING: OCEA 5595.03, PHYC 4595.03, OCEA 4595.03

PHYC 5650.03: General Relativity.

A review of differential geometry will be given followed by an introduction to the general theory of relativity. Various topics will be discussed, including: linearized theory and gravitational radiation, spherically symmetric metrics and the Schwarzchild Solution, gravitational collapse, black holes, and cosmology.
FORMAT: Lecture 3 hours
PREREQUISITE: MATH 3050.06 or permission of the instructor
CROSS-LISTING: MATH 5650.03

PHYC 5660.03: Cosmology.

A self-contained introduction to cosmology will be given and no prior knowledge of differential geometry of general relativity will be assumed (although some knowledge or elementary differential equations will be useful). A cosmological model is a model of the universe, as a whole, on the largest scales; the emphasis of the class will be on the modelling aspects of cosmology.
FORMAT: Lecture 3 hours
PREREQUISITE: Permission of the instructor
CROSS-LISTING: MATH 5410.03

PHYC 6121.03: Quantum Theory.

Selected topics in quantum mechanics: field theoretic and computational techniques.
FORMAT: Lecture 3 hours
PREREQUISITE: PHYC 4151.03 and 4152.03, or permission of the instructor

PHYC 6141.03: Advanced Quantum Theory I.

Topics include path integral methods.
FORMAT: Lecture 3 hours
PREREQUISITE: PHYC 6121.03 or permission of the instructor.

PHYC 6142.03: Advanced Quantum Theory II.

Topics covered include advanced many-body techniques.
FORMAT: Lecture 3 hours
PREREQUISITE: PHYC 6121.03 and 6141.03 or permission of the instructor

PHYC 6201.03: Solid State Physics.

Topics covered include crystal structures, reciprocal lattices, space groups, x-ray scattering, Debye scattering formalism, lattice vibrations, phonon dispersion, specific heat of solids, electronic structure, free electron model and nearly-free electron model.
FORMAT: Lecture 3 hours
PREREQUISITE: PHYC 4151.03 and 4230.03, or permission of the instructor

PHYC 6202.03: Solid State Physics II.

This course is a continuation of PHYC 6201.03 and covers the physical properties of solids at a more advanced level.
FORMAT: Lecture 3 hours
PREREQUISITE: PHYC 6202.03

PHYC 6241.03: Advanced Solid State Physics.

Many body theory. Applications to electron systems, magnetism and phonons.
FORMAT: Lecture 3 hours
PREREQUISITE: PHYC 6201.03 or permission of the instructor

PHYC 6250.03: Experimental Techniques in Material Science.

An introduction to six experimental techniques used in materials science will be given. Examples of techniques that may be covered include x-ray diffraction, x-ray photoelectron spectroscopy, Raman spectroscopy, Mossbauer spectroscopy, neutron diffraction, nuclear magnetic resonance.
INSTRUCTOR(S): R. Dunlap
FORMAT: Lecture
PREREQUISITE: PHYC 3640.03, 3210.03, 4230.03, or permission of the instructor

PHYC 6261.03: Statistical Mechanics I.

Statistical mechanics describes the equilibrium properties of systems. Really it is about how to model properties of soft-systems in the face of fluctuations. We will start with a review of the basic formalism, then discuss mean-field theories, critical phenomenon, diffusion, and stochastic models. Depending on interest and time, we may also discuss opological defects, non-equilibrium phenomenon, and computational techniques. Physical examples and simple models will be discussed throughout the course.
FORMAT: Lecture 3 hours
PREREQUISITE: PHYC 3210.03 and 4151.03, or permission of the instructor

PHYC 6262.03: Statistical Mechanics II.

This class is a continuation of PHYC 6261.03.
FORMAT: Lecture 3 hours
PREREQUISITE: PHYC 6261.03, or permission of the instructor

PHYC 6270.03: Order-Disorder Phenomena and Phase Transitions.

FORMAT: Lecture 3 hours
PREREQUISITE: Permission of the instructor

PHYC 6271.03: Field Theoretical Methods in Critical Phenomena.

Phenomena around the critical point, model Hamiltonians for spin systems, magnetism, renormalization group theory, Landau and Landau-Ginzburg theory, scaling theory and universality, epsilon expansion.
FORMAT: Lecture 3 hours
PREREQUISITE: Permission of the instructor

PHYC 6280.03: Superconductivity.

Discovered in 1911, the fascinating phenomenon of superconductivity is a remarkable example of quantum effects operating on a truly macroscopic scale. Emphasizing fundamental physical phenomena rather than detailed microscopic theory, a number of topics will be covered including: normal Fermi liquids, superfluid He; electrodynamic properties; two-fluid model; London equations; finite temperature effects; Meissner-Ochsenfeld effect; collective modes; Cooper pairs; BCS Theory; Ginzburg-Landau Theory; Bogoliubov's microscopic model; tunnelling; Josephson effect; Type I and Type II superconductors; magnetic flux lattice
FORMAT: Lecture 3 hours
PREREQUISITE: Permission of the instructor

PHYC 6291.03: Surface Science I.

Topics include experimental methods of surface characterization; structure of surfaces and adsorbates; adsorption, desorption and diffusion; surface reconstruction.
FORMAT: Lecture 3 hours
PREREQUISITE: Permission of the instructor

PHYC 6292.03: Surface Science II.

A continuation of PHYC 6291.03 covering surface reactions and catalysis; kinetic theory; lattice gas models; multilayer growth and epitaxy; adhesion and friction.
FORMAT: Lecture 3 hours
PREREQUISITE: Permission of the instructor

PHYC 6301.03: Electrodynamics I.

Topics will normally include: boundary-value methods for problems in electrostatics and magnetostatics, multipolar expansions for the electrostatic and magnetostatic fields, Maxwell equations, plane electromagnetic waves and wave propagation in a variety of media, reflection and transmission of electromagnetic waves at an interface, simple radiating systems, elementary Mie scattering theory.
FORMAT: Lecture 3 hours
PREREQUISITE: PHYC 4110.03, or permission of the instructor

PHYC 6302.03: Electrodynamics II.

Topics will normally include: wave guides and resonant cavities, diffraction, angular frequency, analysis of the radiation by moving charges including synchrotron and Cherenkov radiation, radiation damping, self-fields, scattering and absorption of radiation by bound systems.
FORMAT: Lecture 3 hours
PREREQUISITE: PHYC 6301.03 or permission of the instructor

PHYC 6400.03: Medical Imaging Physics.

This class introduces the physics behind a variety of medical imaging methodologies such as x-ray computed tomography (CT), magnetic resonance imaging (MRI), and radionuclide imaging. Various topics such as the fundamental physics, hardware, specialized techniques, image quality and safety will be covered.

INSTRUCTOR(S): S. Beyea
FORMAT: Lecture
PREREQUISITE: PHYC 3210, PHYC 3640, PHYC 4100, or permission of the instructor

PHYC 6421.03: Radiological Physics.

The material in this course is designed to teach a graduate in physics (or engineering, with strong physics and math) the basics of radiological physics and dosimetry. Quantities and units are introduced early so that radioactive decay and radiation interactions can then be discussed, with emphasis on energy transfer and dose deposition. Exponential attenuation under both narrow and broad-beam conditions must be understood before a student can go on a shielding design in a health physics course.
FORMAT: Lecture 3 hours

PHYC 6422.03: Radiation Therapy Physics.

The course covers ionizing radiation generation and use in radiation therapy to cause controlled biological effects in cancer patient: External Beam Radiation Therapy; Brachytherapy; Treatment, Plannning; Radiation Therapy Devices; Special Techniques in Radiotherapy; Radiation Therapy with Neutrons, Protons, and Heavy Ions.
FORMAT: Lecture 3 hours
PREREQUISITE: PHYC 6421.03

PHYC 6500.03: Magnetism.

Topics covered may include, diamagnetism, paramagnetism, ferromagnetism, mixed magnetic order, spin glasses, phase transitions, rare earth magnetism and magnetic measurement techniques.
FORMAT: Lecture 3 hours
PREREQUISITE: Permission of the instructor

PHYC 6570.03: Light Scattering and Radiative Transfer.

Light Scattering and Radiative Transfer examines a selection of practical aspects of the radiative transfer problem in the atmosphere. The course will begin by covering some necessary modern and advanced programming techniques. The theory of light scattering and absorption will be explored, and the relationship between radiative transfer and the problems of retrieving geophysical properties from radiative measurements will be
investigated. Project work will emphasise the interpretation of measurements from remote-sensing instrumentation."

PHYC 6575.03: Topics in Atmospheric Science.

This advanced graduate class will focus on current research topics in atmospheric science. Fundamental theories of atmospheric science will be applied to the selected topics. Each student will participate in a research project, write a project report and give an oral presentation.
FORMAT: Lecture 3 hours
PREREQUISITE: Permission of the instructor
CROSS-LISTING: OCEA 5575.03

PHYC 6580.03: Cloud Physics.

A detailed examination of the behaviour of condensed water in the atmosphere. Topics include nucleation, hydrodynamics of cloud and precipitation particles, ice physics, mechanisms of precipitation formation, electrical and radiative properties. Cloud dynamics will include effects of latent heating feedback, thunderstorm structure, precipitation efficiency, mixed-phase storms and cloud models.
FORMAT: Lecture 3 hours
PREREQUISITE: Permission of the instructor
CROSS-LISTING: OCEA 5580.03

PHYC 6600.03: Topics in Physics.

Topics selected will depend on the current interests of the instructor and the students.
FORMAT: Lecture 2 hours
PREREQUISITE: Permission of the instructor

PHYC 6601.03: Topics in Physics.

Topics selected will depend on the current interests of the instructor and the students.
FORMAT: Lecture 2 hours
PREREQUISITE: Permission of the instructor

PHYC 6602.03: Topics in Physics.

Topics selected will depend on the current interests of the instructor and the students.
FORMAT: Lecture 2 hours
PREREQUISITE: Permission of the instructor

PHYC 9000.00: MSc Thesis.

PHYC 9530.00: PhD Thesis.

Physiology and Biophysics

Location: Sir Charles Tupper Building, Third Floor
Halifax, NS B3H 1X5
Telephone: (902) 494-3517
Fax: (902) 494-1685

Head of Department

Murphy, P.R.

Graduate Coordinator

Anini, Y.

Professors

Barnes, S.A., PhD (Berkeley). Retinal neurobiology; ion channel function in synaptic communication; novel neuromodulators and neural messengers

Brown, R.E., BSc (Victoria), MA, PhD (Dal), major appointment in Department of Psychology. Olfaction; hormones, parental behaviours; learning and memory; developmental psychobiology; psychopharmacology.

Chauhan, B., PhD (Wales), Major appointment, Department of Ophthalmology. Experimental models of optic nerve and retinal damage, visual function in health and disease, structural and functional assessment of glaucoma, risk factors for the progression of glaucoma.

Croll, R.P., BSc (Tufts), PhD (McGill). Physiology and functional anatomy of invertebrate nervous systems; analyses of motor program generation; regeneration, development, and evolution of identified neurons

Fine, A., AB (Harvard), VMD, PhD (Penn). Neural plasticity; learning and memory, development and regeneration; optical monitoring of neural activity and plasticity; neural transplantation

French, A.S., MSc, PhD (Essex). Sensory transduction and adaptation; epithelial ion transport; ion channel biophysics

Guernsey, D., PhD (Hawaii), Major appointment in Pathology. Molecular basis of carcinogenesis; the role of thyroid hormone and the erb-a oncogene (t3 receptor) in carcinogenesis; thyroid hormone regulation of gene expression.

McDonald, T.F., BSc (Alta), PhD (Dal), DIC (Imperial College). Heart physiology (membrane channels, excitability, coupling, arrhythmia, conduction, contractility); metabolism; cardiac drugs; volume regulation

Meinertzhagen, I.A., BSc (Aberdeen), PhD (St. Andrews), major appointment, Dept. of Psychology. Neurobiology of simple nervous systems, particularly the visual system in Drosophila: neural development and plasticity.

Murphy, P.R., MSc, PhD (Dal). FGF; growth factors; gliomas; lymphomas; gene therapy; antisense

Pelzer, D.J., MD (Heidelberg), DSc (Homburg). Channel function; pharmacology (cardiovascular drugs) and modulation (transmitters, second messengers, G-proteins) of Ca^{2+} Channels; intracellular Ca^{2+} imaging

Rasmusson, D., BA (Colo C), MA, PhD (Dal). Plasticity in the central nervous system; acetylcholine release

Torkkeli, P.H., BSc, MSc, LcSc (Oulu), PhD (Alta). Mechanosensitive, voltage- and ligand-gated ion channels in mechanosensory neurons, central control of mechanosensation.

Wilkinson, M., BSc (Southampton), PhD (London), major appointment, Department of Obstetrics/Gynecology. Molecular neuroendocrinology of leptin and obesity, molecular approaches to the neural control of puberty, hormones and cardiac gene expression.

Associate Professors

Linsdell, P., BSc (London), PhD (Leicester). Ion channel biophysics; chloride channel structure and function; epithelial transport; cystic fibrosis

Morgunov, N., BSc, MSc, PhD (Toronto). Effects of neurotransmitters on membrane transport of anions and cations; electrophysiological electrochemical studies on isolated perfused renal tubules.

Murphy, M.G., MSc, PhD (Dal). Polyunsaturated fatty-acid modulation of neuroreceptor function in cultured neural cells; pathophysiology of Reye's syndrome; potentiation of viral virulence by environmental chemicals

Pelzer, S., PhD (Freiburg), Modulation of Ca^{2+} channels and Na^{+}/Ca^{+} exchange by neurotransmitters; second messengers; G-proteins and drugs; Intracellular Ca^{2+} imaging.

Tremblay, F., BSc, PhD (Montréal), major appointment, Department of Ophthalmology. Neurobiology of vertebrate retina, neuroprotection.

Assistant Professors

Anini, Y., PhD (Paris, France). Prohormones processing. Role of new enteric peptides and adipokines in the regulation of pancreatic secretions and adipogenesis. Hormonal regulation of energy homeostasis. Type 2 diabetes. Obesity.

Chappe, V., MSc, PhD (Marseille, France). Structure, function, recycling and regulation of the CFTR chloride channel; Cystic Fibrosis causing mutations; second messengers; protein kinases; protein interactions; receptors and signalling pathways.

Cowley, E.A., BSc (London), PhD (Leicester). Oxidative stress in lung disease: Role of K^{+} channels in transeptithelial secretion

Krueger, S., PhD (Zurich). Synaptic physiology; development and plasticity of synapses in the central nervous system; regulation of neurotransmitter release.

Information on research interests in the Department and openings for graduate and post-PhD or post-MD study should be requested from the Graduate Coordinator of the Department.

I. Admission Requirements

General requirements for admission to the Faculty of Graduate Studies are given in the Faculty Regulations section of this calendar. In addition, foreign applicants must submit the results of the Graduate Record Examination. A paper-based TOEFL score of at least 600 (computer-based TOEFL score of at least 250) is required of applicants whose native language is not English (see Faculty of Graduate Studies regulations).

II. General Regulations

The Department accepts applicants with degrees in physiology, biology, (bio)physics, chemistry and related biomedical sciences. Applicants with an average GPA of $\geq$ 3.7 over the last two years of their undergraduate program or over their entire undergraduate career will be considered for expedited admission consideration and a Departmental entrance scholarship. Entering graduate students are expected to acquire a firm understanding of the basic principles of physiology at the systems, cellular and molecular levels that will provide a solid foundation for career development. Students who have not completed advanced undergraduate or graduate level classes in these subjects may be required to take appropriate classes from the listings below or from the graduate listings of other Departments. Advanced knowledge within a specialty is developed by formal classes and/or guided study via directed reading classes arranged for each student through consultation with a supervisory committee. Thesis supervisory committees consisting of the research supervisor and at least two members of the Faculty of Graduate Studies knowledgeable in the field are appointed to guide course selection and to oversee the research of graduate candidates. M.Sc. students may elect to transfer to the Ph.D. program after completion of the first year of study, pending approval of the supervisory committee. Entering Ph.D. candidates must have demonstrated the ability to carry out research of high quality. A Comprehensive Examination in areas relevant to the general field of the thesis research (see Faculty of Graduate Studies regulations and below) is required in the Ph.D. program. All graduate students participate in the Physiology seminar series and in teaching/ laboratory demonstrating (PHYL 5517.03).

III. Degree Programs

A. Master of Science (MSc)

For the minimum time required to complete this program, see the Faculty of Graduate Studies regulations. However, students should expect to spend two years working towards the MSc Degree.

Physiology 5517.03 is a mandatory component of the M.Sc. program.

Students must complete enough graduate level classes to equal a total of 2 full credits plus a research thesis. The M.Sc. thesis examination will commence with a public presentation of the research work, then questions from the examining committee chaired by the Graduate Coordinator (or delegate) and the audience. Finally, the examining committee will meet in camera to decide the examination result. A detailed description of examination procedures and possible outcomes is available from the Faculty of Graduate Studies.

B. Doctor of Philosophy (PhD)

For the minimum time required to complete this program, see the Faculty of Graduate Studies regulations. Students should expect to spend a minimum of four years working towards the Ph.D. degree.

Physiology 5517.03 is a mandatory component of the Ph.D. program.

A preliminary examination in subjects relevant to the general field of research is required. The preliminary examination consists of (1) the preparation of a written paper, (2) oral synopsis of the paper, and (3) oral examination of the student on matters related to the topic of the paper. Students must satisfy the examining committee in all 3 areas in order to pass the examination. The student must submit at least 3 topics related to, but not directly associated with, the thesis topic to their supervisory committee for consideration. The topic will then be chosen by the student's supervisory committee (in consultation with the student), and must then be approved by the Graduate Education Committee. The topic cannot be changed without full agreement of both committees.

Research and the presentation and defense of a thesis is required. The Ph.D. thesis examination will follow the rules and regulations of the Faculty of Graduate Studies.

C. Doctor of Philosophy/Master of Science (MSc/ PhD) in Physiology and Biophysics/ Neuroscience

Physiology and Biophysics also offers a MSc and PhD in Physiology and Biophysics/Neuroscience through the Interdisciplinary Neuroscience Program. Please see section on Interdisciplinary and joint programs, page 177

IV. Teaching Requirements

Teaching undergraduate physiology, in laboratories, tutorials, or reviews is considered an integral part of graduate training. All students will be expected to perform a minimum amount of undergraduate teaching, regardless of the source of their financial support.

V. Class Descriptions

Most classes normally require a minimum enrolment of 4 students. If less students are interested, it is left to the discretion of the instructor to offer the class in a different format or not offer the class for that year.

Neuroscience

The following classes are offered through the interdisciplinary neuroscience program:

NESC 6100X/Y.06: Principles of Neuroscience.

This is the core class for all first year Neuroscience graduate students. The first term will focus on cellular and molecular neurobiology and will cover topics such as membrane potentials, synaptic transmission, second messengers, trophic factors, cell differentiation and neurodegeneration. The second term will focus on systems and behavioral neurobiology and will cover topics such as visual and somatosensory systems, motor program generation, autonomic and neuroendocrine functions, motivation, learning, circadian hythmicity and sleep/wake cycles and cognitive neuroscience. Evaluation will be based on several oral and written presentations prepared throughout the year, and grant proposals.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will only be given if both are completed consecutively.
INSTRUCTOR(S): S. Barnes, K. Semba, J. Downie, V. Rafuse

NESC 6101.03: Principles of Neuroscience: Cellular and Molecular Neuroscience.

NESC 6102.03: Principles of Neuroscience: Systems and Behavioral Neuroscience.

Neuroscience 6101.03 and 6102.03 are Neuroscience 6100X/Y.06 divided into terms A and B for suitable incorporation into non-Neuroscience programs. Please see class description of NESC 6100X/Y.06.

Physiology

PHYL 5000.03: Scientific Writing and Presentation Skills.

This class provides training in the written and oral presentation of scientific data. During the first part, the course will focus on the composition of a fellowship application and a research publication. In the second part, students will practice giving scientific presentations in various informal and formal settings.
INSTRUCTOR(S): Y. Anini, V. Chappe, S. Krueger

PHYL 5323.03: Human Physiology: The Mechanisms of Body Functions.

This class covers the physiology of human organ systems including neurophysiology, cardiovascular, respiratory, renal, gastrointestinal and endocrine physiology. In addition to lectures there will be in-depth discussions and analyses of current topics as they apply to the organ systems. This class is mainly directed towards 4th year Honors science students and graduate students.
DIRECTOR: A.S. French
FORMAT: Lecture
PREREQUISITE: Approval of the class director

PHYL 5494.03: Chemical Neurobiology.

The goal of this class is to acquaint the student with contemporary concepts of neurotransmission and neuromodulation. Topics include classical neurotransmitters (catecholamines, acetylcholine, amino acids), neuropeptides (especially opioids), gene expression, and anatomical tracing methods.
DIRECTOR(S): M. Wilkinson and K. Semba
FORMAT: Lecture
PREREQUISITE: PHYL 2030.03; fourth year honors; a graduate program in another department
CROSS-LISTING: ANAT 5070.03, NESC/PSYO 4070.03

PHYL 5504.03: Advanced Topics in Respiration.

This class is directed to students interested in increasing their understanding of aspects of pulmonary biology and pathologies. Examples of typical topics which will be examined in depth include epithelial transport, airway smooth muscle, pulmonary function testing and CFTR regulation.
INSTRUCTOR(S): Individual faculty members in liaison with E. Cowley
FORMAT: Lecture supplemented with tutorials
PREREQUISITE: PHYS 2030 or equivalent plus permission of the course coordinator

PHYL 5508.03/5509.03/5510.03: Directed Readings in Physiology and Biophysics.

These classes allow the Department to provide a more specialized instruction on specific topics to graduate students with particular interests. Class format is variable and may include seminars, lectures, literature searching, evaluation of papers, etc. There is usually a high degree of one-on-one interaction. The classes are organized on a year-to-year basis in accordance with student interest and faculty expertise. Since

different subjects may be covered each year, each class in the series has a separate number.
INSTRUCTOR(S): Individual faculty members in liaison with D. Pelzer (Graduate Coordinator)
PREREQUISITE: Permission of the Director

PHYL 5513.03: Endocrine Physiology.

Offered every second year, or on demand, next offered 2008/2009.
This class provides an in-depth survey of Endocrinology with emphasis on recent developments. This class focuses on modern technologies involved in the study of the physiology and molecular endocrinology of a number of horrmonally-regulated systems. The overall objective of the course is to become familiar with a diverse selection of topics in hormone signaling. Topics include: mechanisms of hormone and neuro-peptides synthesis, secretion and action; signal transduction and transcriptional regulation. Seminars will deal with fundamental as well as advanced aspects of these topics derived from reading very recent review articles and research papers. Students will be expected to make presentations based upon appropriate literature listed by the teaching faculty.
DIRECTOR(S): Y. Anini
PREREQUISITE: PHYL 2030X/Y.06 completed or concomitant, or equivalent, or permission of director

PHYL 5514.03: Reproductive Physiology.

This is a lecture/seminar class devoted to a modern treatment of human and animal reproductive physiology. Topics include: sexual differentiation, sexual maturation, menstrual cycle, male reproduction and the physiology of pregnancy, birth and lactation.
DIRECTOR(S): M. Wilkinson
PREREQUISITE: PHYL 2030X/Y.06; fourth year honors; graduate students (permission of class director)

PHYL 5517.03: Physiology and Biophysics Graduate Seminar.

A mandatory class that all graduate students must complete in order to graduate. Satisfactory performance in the class components is required throughout the degree program in order for the student to be permitted to register for the course in their final year. The main objectives of the class are to provide opportunities for students to acquire experience in giving lectures and poster presentations to scientific audiences, and in assimilating and evaluating scientific information presented by others. Opportunity is also available in giving scheduled lectures to non-medical undergraduate students and in supervising laboratory components of non-medical undergraduate courses as Teaching Assistants.
There are four components to the class:
1. The Physiology and Biophysics Departmental Seminar Series. There are several seminars per year and attendance is mandatory for all graduate students. Students are often given the opportunity to meet informally with guest speakers. Graduate students are also expected to attend relevant seminars in other Faculty of Medicine and University Departments. All graduate students in this class should attend one seminar per week on average.
2. Graduate Student Research Day of the Faculty of Medicine. M.Sc. students are required to present a poster at the annual Graduate Student Research Day of the Faculty of Medicine in their second year of study (and annually thereafter for as long as they are in the program). Ph.D. students must participate in the Graduate Student Research Day of the Faculty of Medicine in their second year of study and yearly thereafter. If a student for valid reasons cannot meet the date of Graduate Student Research Day of the Faculty of Medicine, presentation of a poster at a national or international conference is considered as equivalent.
3. M.Sc. students must present one Departmental Seminar; Ph.D. students must present two Departmental Seminars over the course of their program. Each student seminar is monitored by a faculty committee selected by the Graduate Education Committee to ensure that the students receive oral and written feedback on their presentation.
4. Participation as Teaching Assistants in the laboratory components of non-medical undergraduate Physiology courses is mandatory. One-on-one tutoring of undergraduate students in these courses is expected from all graduate students.
DIRECTOR(S): Y. Anini

PHYL 5519.03: Molecular Physiology of Ion Channels.

This class focuses on the molecular properties of ion channels, and includes an overview of the techniques used to study ion channel structure and function, ion permeation and selectivity, channel gating and modulation, the mechanisms by which channels are affected by drugs and toxins, and genetic diseases causing channel dysfunction.
DIRECTOR(S): P. Linsdell
FORMAT: Lectures/student presentations
PREREQUISITE: PHYL 3320.03 or 4327.03 or equivalent plus permission of the class director

PHYL 5521.03: Molecular Physiology.

Offered every second year, next offered in 2008/2009.
This is a lecture/seminar class designed to give the student an in--depth exposure to contemporary concepts of the physiology of intracellular communications. Topics include transmembrane and intracellular receptors, ion channels, molecular adaptor proteins, signal transduction pathways and signal cross--talk. The class consists of lectures, guided reading and student presentations of recent research papers in the field. Evaluation is based on participation and presentations (50%), and on a written paper in the format of a research grant application.
INSTRUCTOR(S): P.R. Murphy (Director) and staff
FORMAT: Lecture/seminar and guided reading
PREREQUISITE: BIOC 4301.03 or permission of the class director

PHYL 5608.06/5609.06/5610.06: Directed Readings in Physiology and Biophysics.

These classes allow the Department to provide more specialized instruction on specific topics to graduate students with particular interests. Class format is variable and may include seminars, lectures, literature searching, evaluation of papers, etc. There is usually a high degree of one-on-one interaction. The classes are organized on a year-to-year basis in accordance with student interest and faculty expertise. Since different subjects may be covered each year, each class in the series has a separate number.
INSTRUCTOR(S): Individual faculty members in liaison with D. J. Pelzer (Graduate Coordinator)
PREREQUISITE: Permission of the Director

PHYL 9000.00: MSc Thesis.

MSc students should register for this "class" each year.

PHYL 9530.00: PhD Thesis.

PhD students should register for this "class" each year.

Physiotherapy

Location: Forrest Building, 4th Floor
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Telephone: (902) 494-2524
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Walker, N., BSc(PT) Dal, MSc (Queens)

Provincial Clinical Coordinators
Dubé, P., Clinical Placement Administrator, New Brunswick
Beer, J., DipPT (Dal) Prince Edward Island
Lund, K., BSc(PT) (Dal) Prince Edward Island
O'Dea, J., BSc (PT) (McGill) Newfoundland
Roussel, M., Program Coordinator, New Brunswick

The Master of Science (Physiotherapy) degree provides the professional education required to obtain a license to practice physiotherapy. It differs from the Master of Science - Rehabilitation Research in Physiotherapy which prepares practitioners with advanced research skills and requires the completion and defense of a thesis. The profession of Physiotherapy (or Physical Therapy) offers a varied, interesting and worthwhile career in a variety of settings. Upon graduation, traditionally most Physiotherapists have worked in hospital-based departments rotating through various areas of interest prior to becoming more deeply involved in any specific area. Increasingly, opportunities are available in rehabilitation centres, extended care units, special schools, or with local government agencies, industrial health units, sports clubs and private clinics.

A. Master of Science (Physiotherapy)

The MSc (Physiotherapy) entry to practice program is full-time and offered over a continuous 26-month period. The curriculum prepares students with the professional education and experience necessary to apply for the national licensing examination. The School of Physiotherapy at Dalhousie is the only school serving Atlantic Canada; as such, a provincial quota system is in place with a specified number of seats allocated annually for residents of New Brunswick, Prince Edward Island, Newfoundland and Nova Scotia. A small number of seats are open to non-residents. Therefore, admission is offered on a competitive basis and enrolment is limited.

I. Admission Requirements

- Candidates must satisfy the general requirements for admission to the Faculty of Graduate Studies.
- A four-year undergraduate degree or equivalent in any field of study from Dalhousie University or from a recognized academic institution with a minimum grade point average of 3.0 or letter grade of B in the last 60 undergraduate credit hours for Atlantic Canada and a GPA of 3.4 or letter grade of B+ for applicants outside Atlantic Canada. Degrees that have a focus in Neuroscience, Psychology, Human Movement Science, Exercise Science, Human Physiology, Health Promotion, Ergonomics and Anatomy are favorable backgrounds for the study of Physiotherapy. It is incumbent upon applicants with different backgrounds to demonstrate that their educational background is suitable for the MSc (Physiotherapy) program.
- The following courses or their equivalents are prerequisites for admission:
  Physics (3 credit hours)
  Biology (3 credit hours) Animal or Cell Biology
  Psychology (6 credit hours)
  Statistics (3 credit hours)
  Research Methods (3 credit hours) courses from various fields of study will be considered
  Introduction to Biomechanics (3 credit hours equivalent to KINE 2465 or PHYC 2610)
  Human Physiology (6 credit hours, PHYL 2030.06 or its equivalent is the preferred prerequisite, students unable to obtain PHYL 2030 or its equivalent may contact the school for potential substitutes).
  Human/Vertebrate Anatomy (3 credit hours, equivalent to ANAT 1010.03)
  Languages and Humanities and/or Social Sciences (6 credit hours, e.g. Classics, Contemporary Studies, Theatre, Dance, Music, Languages, Philosophy can include a combination of two half credits)
- Reference Letters - academic and personal
- 40 hours of community volunteer experience over the last two years
- Immunization - In order to satisfy the requirements for the clinical internship components of the program, students must supply proof of immunization to the Coordinator of Clinical Education for: Diphtheria-Tetanus, Polio, Measles (Rubeola), Mumps and Varicella. Before students can enter the clinical setting, they must supply verification of a Tuberculosis skin test and serology stating immunization status of Measles, Rubella, Varicella and Hepatitis B.
- Affirmative Action - The School of Physiotherapy is committed to increasing the number of qualified physiotherapists who belong to African-American, Mi'kmaq or Inuit groups of the Atlantic region. The School encourages applicants who wish to apply under this policy to indicate so on the Supplementary Application Form.
- Applicants who meet the above minimum requirements are eligible for interview consideration. The interview score is based on communication, problem-solving analysis, group interaction and writing skills (eligibility for interview is based on the GPA). Fulfillment of the minimum requirements does not guarantee an interview.

Deadline for application is January 31.

II. Registration Physiotherapy

Physiotherapists educated in Canada must be registered with the appropriate regulatory body. The School itself has no jurisdiction in matters related to regulation, and Dalhousie University cannot accept responsibility for changes in regulatory regulations which may occur from time to time.

The degree program at Dalhousie University is designed to fulfil the present registration requirements by the time students graduate. A Physiotherapy Competency Examination was implemented in 1993. Successful completion of the national competency exam is required for registration. Graduates are strongly advised to seek further information and clarification from the appropriate provincial College of Physiotherapists.

III. Association Membership

Information regarding membership in various Physiotherapy Associations can be obtained from the following sources: The Canadian Physiotherapy Association (2345 Young St., Suite 410, Toronto, Ontario, M4P 2E5); The Chartered Society of Physiotherapy (14 Bedford Row, London, WC1R 4ED, England); The American Physical Therapy Association (1111 North Fairfax St., Alexandria, Virginia, 22314, U.S.A.).

IV. Accreditation

The MSc (Physiotherapy) program is designed to develop an educational qualification for entry to the physiotherapy profession. Physiotherapy programs are accredited by the Accreditation Council for Canadian Physiotherapy Academic Programs (ACCPAP). ACCPAP is an incorporated body under the Canada Corporations Act and is the accrediting agency for physiotherapy education in Canada. It is anticipated that the MSc (Physiotherapy) program will be accredited by 2009.

V. Class Descriptions

PHYT 5101.01: Introduction to the Physiotherapy Profession.

This introductory module will provide the student with an orientation to the entire curriculum by: discussing expectations, evaluation, structure and process; help to familiarize the student with the health care context of the practice of physiotherapy; introduce students to the profession of physiotherapy through discussion and site visits; instruct and provide opportunity to practice interpersonal skills and professional behaviors that will continue to develop throughout the two years and that will prepare graduates to be professionals. Subsequent modules will deepen students understanding and apply in practice many of the concepts presented in this orientation module.
FORMAT: Lecture/lab, tutorials/seminars
PREREQUISITE: Entry to MSc PT

PHYT 5102.09: Scientific Inquiry.

Students will gain an appreciation of the process associated with evidence-based and best practice interventions. Students will be provided with critical appraisal, evaluative, and research skills integrated with, and embedded within, all subsequent course work and clinical experiences. This framework confirms our philosophy that critical appraisal and best practice is core to physiotherapy practice.
FORMAT: Lecture/lab/discussion/seminars
PREREQUISITE: Entry to MSc PT

PHYT 5103.03: Movement and Exercise Science.

The purpose of this module is to provide students with an understanding of the theories and principles associated with the study of human movement and exercise science so they can apply these to solve clinical problems encountered in physiotherapy practice. Understanding these concepts as they apply to normal movement and exercise will precede a discussion of clinical problems. The movement and exercise science module will provide the foundation for applying anatomy, biomechanics, and exercise physiology to evaluate motion and exercise therapy.
FORMAT: Lecture/lab
PREREQUISITE: Module 1 - PHYT 5101
CO-REQUISITE: Anatomy and Exercise Physiology

PHYT 5104.06: Cardiorespiratory Physiotherapy and Health Promotion.

This module provides students with knowledge, skills and behavioral competencies, including clinical reasoning skills, to practice effectively in the cardiorespiratory area of physiotherapy and to consistently integrate evidence based/best practice cardiorespiratory PT into holistic patient care. Overall objectives are also consistent with those outlined for Clinical Practice for cardiorespiratory clinical placements.
FORMAT: Lecture/lab
PREREQUISITE: Completion of Module 1
CO-REQUISITE: Anatomy, Exercise Physiology, Modules 2 & 3

PHYT 5105.12: Musculoskeletal Physiotherapy.

The purpose of this module is to develop the ability to use prospective reasoning to formulate and implement a three phase approach to the management of common musculoskeletal (MSK) dysfunctions: assessment, evaluation, and intervention. This module includes most age groups, and includes MSK dysfunctions related to home, work, leisure, and sport.
FORMAT: Lecture/lab
PREREQUISITE: Human Anatomy, Exercise Physiology and Modules 1,3,4
CO-REQUISITE: Module 2

PHYT 5460.03: Advanced Exercise Physiology.

The course consists of lectures, tutorials, student presentations, and class discussion periods. Approximately one-third of the content concern, cellular and systems exercise physiology and one-third exercise in individuals with altered physiological state, injuries, and maladies.
FORMAT: Lecture/tutorial
PREREQUISITE: Admission to MSC (PT) program

PHYT 5501.03: Clinical Internships (Cardiorespiratory).

The clinical component of the program provides for the integration and application of learning in current academic studies to the clinical environment leading to the development of clinical competence in Cardiorespiratory practice. Each student is required to complete 6 weeks of full time clinical practice in the cardiorespiratory practice area to gain an understanding of the scope and role of cardiorespiratory physiotherapy practice in tertiary, community and primary health care environments.
FORMAT: Students will experience supervised clinical practice with the addition of lectures, labs, small-case studies and self-directed learning.
PREREQUISITE: Modules 1,3,4. Anatomy and Exercise Physiology, Module 2 - Critical Appraisal of the C/R literature

PHYT 5502.03: Clinical Internships (Musculoskeletal).

The clinical component of the program provides for the integration and application of learning in current academic studies to the clinical environment leading to the development of clinical competence in musculoskeletal practice. Each student is required to complete 6 weeks of full time clinical practice with exposure to a variety of practice areas in physiotherapy. It is expected that the student will gain an understanding of the scope and role of musculoskeletal physiotherapy practice in tertiary, community and primary health care environments.
FORMAT: Clinical skills lab
PREREQUISITE: Anatomy & Exercise Physiology Modules 1,3 and 5

PHYT 6106.03: Professional, Ethical, and Management Issues in Physiotherapy.

This module builds on professional and communication objectives embedded throughout the program. Emphasis is placed on professional behaviors based on the current ethical and legal framework for practice and the role physiotherapy plays as an integral component of Canadian healthcare. Students will engage in dialogue and debate on issues of healthcare management, reform, and the business of physiotherapy.
FORMAT: Lecture/seminar, small group discussions, and student debates
PREREQUISITE: Completion of Year 1

PHYT 6107.06: Neurological Physiotherapy Practice for the Entry-Level Clinician.

This academic module gives students the opportunity to acquire knowledge and develop the competencies and professional behaviors in preparation for physiotherapy practice for individuals with neurologic disorders. Neurophysiological concepts and neurotherapeutic approaches to assessment and management of conditions across the lifespan and across the continuum of care are introduced in an integrated manner. Students are required to draw on their knowledge of anatomy, neuroanatomy, physiology, exercise physiology, and therapeutic exercise as they explore topics in neurological physiotherapy. Emphasis is placed on understanding theoretical principles and developing assessment and treatment skills through critical analysis of case studies, laboratory practice, clinical visits, and self-directed learning. The International Classification of Functioning, Disability and Health (ICF) and the Clinical Reasoning Model serve as theoretical frameworks to prepare students for effective practice. This academic module is followed by a 6-week clinical internship in neurological physiotherapy.

FORMAT: Lectures, seminars, small group discussions, labs, clinical visits, patient demonstrations, student presentations, clinical site visits

PREREQUISITE: ANAT 5217.03, PHYT 5460.03, PHYT 5101.03, PHYT 5104.03, PHYT 5501.03, PHYt 5502.03, PHYT 5106.03

PHYT 6108.12: Integrated Practice in Acute, Rehabilitation and Home/Community Settings.

This module provides advanced knowledge and expertise in evidence-based assessment and treatment of people with complex conditions affecting cardiopulmonary, musculoskeletal and neurological systems. Emphasis will be placed on cases illustrating co-morbidities and complex psychosocial issues, and on development of clinical reasoning, plus active, sustainable learning skills.

FORMAT: Case studies, labs, lectures, seminars/tutorials, site visists

PREREQUISITE: Successful completion of Module 7, Neurophysiology, Internship 3 Neurotherapeutics

PHYT 6140.06: Neuroscience for Physiotherapy Students.

This graduate level course in neuroscience will expose entry-level physiotherapy students to the foundational and advanced neuroanatomical and neurophysiological concepts and knowledge needed for evidence-based practice in neuro-rehabilitation.

FORMAT: Lecture, lab, seminar

PREREQUISITE: ANAT 5217.03, PHYT 5460.03, PHYT 5101.03, PHYT 5103.03, PHYT 5104.03, PHYT 5105.03, PHYT 5501.03, PHYT 5502.03

PHYT 6501.03: Clinical Internship (Neurotherapeutics).

The clinical component of the program provides for the integration and application of learning in current academic studies to the clinical environment leading to the development of competence in neurotherapeutics practice. Each student is required to complete 6 weeks of full time clinical practice with exposure to a variety of practice areas in physiotherapy. It is expected that the student will gain an understanding of the scope and role of neurotherapeutic physiotherapy practice in tertiary, community and primary health care environments.

FORMAT: Students will experience supervised clinical practice with the addition of lectures, labs, small group-case studies and self-directed learning.

PREREQUISITE: Modules 1-4

CO-REQUISITE: Neuroanatomy and Neurophysiology, critical appraisal of the neurological literature.

PHYT 6502.03: Clinical Internship (Integrated Practice).

The clinical component of the program provides for the integration and application of learning in current academic studies to the clinical environment leading to the development of clinical competence. The student will gain understanding of the theoretical and practical application of physiotherapy in complex conditions in all practice areas. This builds upon the previous internships in cardiorespiratory, musculoskeletal and Neurotherapeutics, and allows the student to assess and treat patients with multiple problems in co-morbidities. This will include the areas of geriatrics, paediatrics, private practice, industry, comunity practice, innovative practice and/or any area that enhances previous clinical and academic experience. Those internships could be in the following:

- Geriatrics (Assessment, long term care or day hospital)
- Home Care or Community Care
- Regional Hospital for a mixture of In and Out patient care
- Paediatrics
- Private Practice

FORMAT: Students will experience supervised clinical practice with the addition of lectures, labs, small group-case studies and self-directed learning.

PREREQUISITE: All academic courses in the previous 5 terms and the clinical internships in Cardiorespiratory and Health Promotion, Musculoskeletal and Neurotherapeutics.

CO-REQUISITE: Research Projects

PHYT 6503.03: Clinical Internship (Emerging Roles).

The clinical component of the program provides for the integration and application of learning in current academic studies to the clinical environment leading to the development of clinical competence. The purpose of the internship is to provide the student with an opportunity to learn consultation skills, to engage in program development and evaluation, and to educate others about the role of physiotherapy. Through working independently and advocating for their professional role, students learn skills that will serve them well as they enter the profession. Some students may require another internship in one of the following areas:

- Outpatient Musculoskeletal/inpatient musculoskeletal
- Neurosciences
- Cardiorespiratory/cardiopulmonary practice

FORMAT: Students will experience supervised clinical practice with the addition of lectures, labs, small group-case studies and self-directed learning.

PREREQUISITE: All academic courses in the previous 5 terms and the clinical internships in Cardiorespiratory and Health Promotion, Musculoskeletal and Neurotherapeutics.

CO-REQUISITE: Research Projects

B. Master of Science (Rehabilitation Research - Physiotherapy)

I. Introduction

The Master of Science (Rehabilitation Research -Physiotherapy) is a thesis-based program designed to provide graduates with:

1. The ability to design and implement research in diverse areas of Physiotherapy
2. Knowledge necessary to integrate evidence-based assessment and treatment in Physiotherapy
3. Valuable teaching experience in the MSc (Physiotherapy) program.

The Master of Science (Rehabilitation Research-Physiotherapy) does not prepare graduates to take the physiotherapy licensure exams; applicants who want to study to become physiotherapists need to apply to the MSc (Physiotherapy) program.

Individuals seeking enrichment for their professional development may also apply for admission to single graduate level courses, through the Special Student-Graduate Studies category as detailed in Section 4.3.8 of this calendar.

II. Admission Requirements

Candidates must satisfy the general requirements for admission to the Faculty of Graduate Studies. In addition, applicants must hold a university degree in Physiotherapy, or in a related area of study.

III. Application

A. Applicants must

a. Complete the application form for admission to the Faculty of Graduate Studies
b. Include a one page statement of their experience, their goals and objectives, and the area of physiotherapy research to be studied.
c. Meet the English language competency requirements as outlined by Graduate Studies
d. Include two academic references. A work reference from someone who may comment objectively on your goals may be included in addition to the two required academic references.

In addition applicants are strongly advised to

a. Include a copy of a recent paper authored in the area in which the applicant is planning to pursue studies (if available)
b. Submit a recent GRE score
c. Contact potential supervisors to discuss their research interests prior to submitting their application.

B. Scholarship Deadlines

Applicants who wish to be considered for scholarships are strongly urged to have their applications completed by January 1 for University Scholarships. **For School of Physiotherapy Scholarships: March 1**.

A limited amount of money is available from the School of Physiotherapy and this will be distributed on a competitive basis. Applicants are encouraged to seek external funding. Further information for sources of funding may be obtained from the Graduate Studies office. In order to qualify for scholarship consideration a student is expected to hold a first-class honours degree in an appropriate field and to enter a full-time graduate program.

C. Application Inquiries

For more information regarding admission and program requirements, please write to the Graduate Coordinator, School of Physiotherapy, Dalhousie University, Halifax, NS, B3H 3J5.

IV. Program Requirements

A. Program Requirements

Students registered in the program will be expected to obtain a minimum of five (5) credits as follows: Thesis - 2 credits, Class work - 6 half credits.

B. Class Work

Three half-credits are obtained via required courses. The other three half-credit elective classes will be selected based on the individual program of study approved by the Supervisory Committee. Graduate students are also expected to attend and participate in Physiotherapy Research Seminars.

C. Residency

For full-time students, it is expected that upon completion of the class work an additional year will be required to complete the thesis. Part of the residency period may, with permission, include time off campus. There are options to complete the program on a part-time basis.

V. Class Descriptions

An approved half credit class in Statistical Methods and/or Research Design (required).

PHYT 5002.03: Instrumentation and Measurement (Required).

This class is aimed at providing the student with the theoretical basis and practical experience associated with measurement techniques used in Physiotherapy Research. The content of the class will focus on the fundamentals of instrumentation and measurement of biomechanical and physiological measures. The objective of this class is to gain the necessary knowledge and skills for data acquisition, processing and interpretation of electrophysiological, kinematic and kinetic data.

PHYT 5010.03: Special Topics in Musculoskeletal II.

This class is designed to provide in depth study of the evidence guiding physiotherapy assessments and interventions for the prevention and treatment of designated musculoskeletal impairments. Current theories and practices will be examined using examples such as disorders that are associated with the electronic workplace, arthritic conditions, or low back pain.

PHYT 5030.03: Special Topics in Neurology I.

In this class, students will conduct a critical analysis of the evidence supporting physiotherapy management of people with functional disabilities arising from diseases or conditions that affect neurological control of movement. The class will emphasize topics such as the sensory-motor and neuromuscular control processes that affect gait, balance and functional abilities of a variety of populations (e.g., aging adults, and people with functional impairments due to Parkinson's, cerebrovascular accident, or arthritic conditions).

PHYT 5050.03: Special Topics in Cardiac Rehabilitation III.

Students will conduct an advanced analysis of the theories and tenets underlying physiotherapy management of cardiovascular disorders. Scientific evidence will be applied to support assessment and intervention strategies to address cardio-respiratory function or cardiovascular fitness. Examples will be based on topics such as health-promotion, cardiac rehabilitation, and cardiovascular function following cerebral stroke.

PHYT 5070.03/5080.03: Directed Studies.

Individual students work with a designated faculty member to conduct an in-depth examination of a topic that is chosen to address a specific educational need. The content, resources, and evaluation methods are customized to address a specific learning issue that relates to the student's research area.

PHYT 5090.03: Foundations Seminar.

This class will provide students with the opportunity to study physiotherapy and rehabilitation services from a historical perspective and with a view to emerging trends. Delivery models will be evaluated, and novel approaches formulated which will be relevant to emerging health-care needs both in developed and developing countries utilizing a framework of clinical care, education and research. Methods of using new technologies and methods to enhance the time and cost efficiency of service provision will be considered, as will the influencing of health-care policy formulation.

PHYT 5300.03: Skeletal Muscle Function through Surface Electromyography.

Electromyography provides an extracellular view of the processes associated with skeletal muscle activation, and thus an important link to physiology when studying human movement. The objective of this class is to provide the student with the theoretical foundation for EMG studies, practical experience in acquiring EMG data and with an opportunity to critically evaluate the current literature that uses surface EMG to study muscle function on topics such as pathological gait, dynamic stability of the spine, therapeutic exercise assessment and functional impairments. The class will consist of small group sessions, seminars and laboratory experiences.

PHYT 9000.00: Thesis (Required).

Planning

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Director

Grant, J.

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Garnet, M., BComm (Concordia), MURP (TUNS), MCIP
Spencer, V., BES (Waterloo), MCIP
Wishart, B., BA (STU), BEd (Lakehead), MURP (Queen's), MPA (Dal), MCIP
Zwicker, B., BA (Dal), MUrb.Reg.Plan (Toronto), MCIP

Cross-appointed Faculty

Beazley, K., major appointment in Resource and Environmental Studies
Boxall, J., major appointment as Map and Geospatial Information Librarian, Killam Library
Buszard, D., major appointment in Biology
Cote, R., major appointment in Resource and Environmental Studies
Duinker, P., major appointment in Resource and Environmental Studies
Wright, T., major appointment in Environmental Science, Faculty of Science

Departmental Secretary

Madden, C.

I. Introduction

The School of Planning provides a professional planning education at the graduate level. The program is recognised by the Canadian Institute of Planners. Many graduates of the program will become professional planners working for private firms, for government, or in non-governmental organizations. Others will find that the education provides a solid foundation for careers in related spheres such as international development, environmental protection, or urban design. Planning provides a skill set and a way of thinking with broad application.

Planners are involved in a variety of activities that shape the future of communities, the quality of the environment, and the character of daily life. In their work for government, planners engage and motivate the public, help to develop a wide range of policies affecting the character and potential of communities, and act as guardians of the environment and of our built heritage. Working as consultants in the private sector, planners undertake a wide variety of tasks ranging from physical design and transportation planning, to creating strategies for sustainable or "smart" development. Planners work throughout the world, from the heart of Canada's towns and cities to the fields and villages of the Third World.

The School of Planning encourages initiative, resourcefulness, and creative questioning of received doctrine. The curriculum of the School emphasizes: (a) up-to-date skills; (b) a sound appreciation of the environmental, social, and economic processes that shape the form and character of communities; (c) the active contribution of students in confronting and resolving contemporary planning problems in local communities; and (d) the development of personal capabilities suited to the leadership roles that planners assume.

Through environmental and community-centered learning, teaching, research and practice, faculty members and students in the School engage in the planning and design of settlements in a variety of scales and contexts. Central to the graduate planning program are studio courses (where learning is gained through real projects based in the community). Studio course content is delivered in a way that meets academic objectives within the practice of dealing with community planning issues. Thus the studio integrates theory and practice. Students also have opportunities to participate in field trips within the region and to international cities to learn about planning outside of Halifax.

The Planning School also offers professional planners the opportunity to extend their education through focused research in the Master of Planning Studies (MPS) program.

A. Work Term

The program includes a work term (during the summer after the first academic year) that provides students with practical experience in planning. The Career Co-ordinator for the Faculty of Architecture and Planning assists students in their search for suitable work term placements; students should note, however, that they are responsible for securing appropriate placements. In recent years, planning students have been employed throughout Atlantic Canada and most other Canadian provinces, and some have chosen to work abroad (e.g., in the United States, Gambia, England). Students are encouraged to begin their search for work-term placements early in their first year of study in the program, and to be prepared to travel outside of the Halifax area to obtain work experience.

B. Professional Registration

On completion of the MPlan degree, and after obtaining professional work experience, graduates are eligible for full membership in the Canadian Institute of Planners (CIP) (in some provinces, candidates for membership may have to write an exam to qualify). A foreign applicant is advised to contact his/her national accreditation organization about requirements for professional registration (many professional organizations have transfer agreements with CIP to facilitate exchange).

The MPS is a post professional program intended for individuals who have already met the requirements for membership in the Canadian Institute of Planners (or equivalent).

II. Degree Programs

A. Master of Planning (MPlan)

The Masters program is a 20-month program with a work term in the summer (third) semester. The program may also be completed through part-time study over a longer period of time (maximum 7 years). The program consists of 42 credit hours of required course work, and 18 credit hours of elective course work. The work term is a non-credit academic requirement.

Because of the interactive nature of the core studio and class curriculum, students must be present on campus during the terms they register for required courses, except for the work term.

The required classes provide the fundamental elements of a planning education. They cover planning theory, history, practice, law, and methods, and provide community-based project experience that allows students to understand the institutional, social, and environmental contexts within which planners work. Classes allow students to develop planning skills and knowledge and to apply them to real community problems.

The elective classes enable students to pursue individual interests and areas of specialized knowledge. Classes offered within the School focus on community design, urban design, environmental planning, land use planning, urban and environmental history, economics, housing, and land development. Students must take at least half of their elective credits from offerings within the School of Planning.

Electives may be taken in other Dalhousie departments, or at other universities in Halifax, with the permission of the School. In some cases, elective credit may be given for suitable classes taken at other universities in Canada or abroad.

B. Master of Engineering/Master of Planning (MEng/MPlan) and Master of Applied Science/Master of Planning (MASc/MPlan)

Joint degrees offer a special opportunity to graduates of engineering or some natural science programs to develop a program of study that offers professional standing in planning while also providing further education within civil engineering. These programs are ideal for students with interests such as water resources planning, waste management, transportation, or infrastructure planning.

Joint degrees require programs of study that satisfy both the planning requirements and the MEng or MASc requirements of the Department of Civil Engineering. Normally a student must:

a. take the required classes needed for each degree;
b. take sufficient electives to satisfy the requirements of each degree (with some or all of these satisfying the requirements of both degrees);
c. complete a planning work term:
d. undertake a project (in the case of the MEng/MPlan) or a thesis (in the case of the MASc/MPlan) that is approved by both School of Planning and Department of Civil Engineering.

(Note: Students who do not have appropriate engineering background may be required to take additional course work. The MASc/MPlan degree may require more than twenty months to complete.)

C. Master of Planning Studies

The MPS program is a research focused post professional degree intended for applicants who through previous education and/or work experience are eligible for membership in the professional planners' institute. The program is designed to be completed in one year of full-time study, or up to five years of part-time study. Students must complete at least one winter semester in full-time study at Dalhousie University.

The program will appeal to candidates with a solid grounding in the fundamentals of planning who have earned an undergraduate degree and wish to pursue graduate studies. The Master of Planning Studies has research as its focus. It welcomes candidates with questions they want to explore in an academic setting under the supervision of a Dalhousie faculty member.

The curriculum includes mandatory and elective courses and a thesis. Students must demonstrate proficiency in research methods appropriate for the thesis or complete an approved methods course. Two additional mandatory courses provide a context for exploring current ideas, issues and ethics and an opportunity to develop the thesis proposal. Elective courses are based on individual interest and support the thesis research focus.

III. Admission Requirements

A. Minimum Academic Requirements

Each September, the School admits approximately twenty to twenty-five students. The School seeks students with high scholastic standing and demonstrated academic interests or community experience pertinent to planning. All candidates must meet the Admissions Regulations of the Faculty of Graduate Studies (3.0 minimum average GPA in a four year undergraduate degree).

Master of Planning

Admission to the MPlan program requires an undergraduate degree with high scholastic standing. In special circumstances where mature applicants are involved, applications supported by significant career experience may be considered.

Master of Engineering/Master of Planning

Admission to this joint program requires an engineering degree with high scholastic standing or its equivalent through a combination of an engineering degree and career experience.

Master of Applied Science/Master of Planning

Admission to this joint program requires an engineering degree with high scholastic standing, a science degree with honours and high scholastic standing, or the equivalent of one of these through a combination of educational attainment and career experience.

Master of Planning Studies

Admission to the MPS program normally requires either a four-year undergraduate degree from a professional planning program, or a four year degree in any subject with four years of planning work experience to make the candidate eligible for membership in a professional planning institute.

The School may also consider candidates with three-year undergraduate degrees in related disciplines who present an extraordinary portfolio of work and have at least four years of responsible planning experience that makes them eligible for membership in the professional planners' institute.

Entrance will be limited according to the School's ability to offer appropriate faculty supervision. Only those candidates with research interests compatible with those of faculty members will be eligible for admission. Enrolment may begin in either January or September.

B. Inquiries

Please contact the School of Planning for an application package and additional information about graduate programs in planning. (The School's phone number, email address and website are shown at the beginning of this calendar section.) Please contact the Dalhousie University Office of the Registrar for information on admission status or registration.

C. Application Deadlines

While there is no cutoff date for the consideration of applications, candidates for M.Plan, M.Eng./M.Plan, M.A.Sc./M.Plan should normally submit their application by February 1. Admission is very competitive and some scholarships are only available to candidates whose application has been received by the beginning of February.

Students begin their courses in September. Only in exceptional circumstances are students permitted to enter the MPLAN program at other times.

For MPS, applications may be considered at any time but are expected to take at least two months to process. Enrolment may begin in either January (preferred) or September.

International applicants must ensure that their complete application has arrived by February 1, to allow sufficient time for visa processing.

D. Transfer Students

Applicants who have completed part of another graduate planning program will be considered for transfer credit by the Admissions Committee. A transfer student must complete a minimum of 30 credit hours of classes including the planning project within the MPlan program to qualify for the degree. Students transferring in to the joint MASc/

MPlan program must complete a minimum of 18 credit hours of classes and a thesis within the program.

E. English Language Competency

Applicants whose native language is not English must meet the Faculty of Graduate Studies requirements for English Language Competency (see FGS calendar section 2.4). Students admitted to the program may be required to take further training in English in Canada, in the summer preceding the start of the program.

IV. Academic Regulations

In addition to the Faculty of Graduate Studies regulations, the following policies apply to the School of Planning.

Readmission

A student who wishes to be readmitted to the program after withdrawing or failing to register for three consecutive terms, must reapply as though he/she were a new applicant to the program.

Transfer credits

A student who wishes the School to consider transfer credits must apply no later than October 1 of the year the student enters the program. Graduate level credits earned outside of a completed degree program may be accepted as electives if (a) the School accepts them as electives relevant to a planning education, and (b) the student earned a grade of B or better.

V. Planning Classes

Students in the program take 60 credit hours, or equivalent, and complete a work term. The sessional distribution of classes throughout the two years of the planning program is outlined below.

Full-time students normally register for 12 to 18 credit hours per semester. Class credit hours are shown after the decimal place in the class number: e.g., ".03" means 3 credit hours; in a one-semester lecture class, the number of credit hours is roughly equal to the weekly contact hours, and there is an expectation of about double that time of work outside class hours. Note that studio classes are 6 credit hours, though only one semester long.

Required courses: 42 credit hours (11 classes)

- PLAN 5000.06: Planning Studio 1
- PLAN 5101.03: History and Philosophy of Planning
- PLAN 5102.03: Planning Practice
- PLAN 5104.03: Planning Law
- PLAN 5201.00: Work Term (non-credit)
- PLAN 5301.015: Planning Methods A
- PLAN 5302.015: Planning Methods B
- PLAN 5500.06: Planning Studio 2
- PLAN 6000.09: Planning Project and Seminar
- PLAN 6500.06: Integrated Team Project
- PLAN 6505.03: Seminar on Theories, Ideas, and Debates in Planning
- Elective credits: 18 credit hours (six half classes, or equivalent).

Students select 18 credit hours of electives over the course of their studies.

In the joint MEng/MPlan program, students complete the following requirements:

- PLAN 5000.06: Planning Studio 1
- PLAN 5101.03: History and Philosophy of Planning
- PLAN 5102.03: Planning Practice
- PLAN 5104.03: Planning Law
- PLAN 5201.00: Work Term
- PLAN 5301.015: Planning Methods A
- PLAN 5302.015: Planning Methods B
- PLAN 5500.06: Planning Studio 2
- PLAN 6505.03: Seminar: Theories, Ideas, Debates in Planning
- PLAN 9102.09: M.Eng/M.Plan Project (students in this class participate in the Planning Project Seminar class)
- Graduate seminar in Engineering
- and 7 classes (21 credit hours) in Engineering classes.

In the joint MASc/MPlan program, students will do a combined thesis during the last year of the program in lieu of the planning project. Students complete the following requirements:

- PLAN 5000.06: Planning Studio 1
- PLAN 5101.03: History and Philosophy of Planning
- PLAN 5102.03: Planning Practice
- PLAN 5104.03: Planning Law
- PLAN 5201.00: Work Term
- PLAN 5301.015: Planning Methods A
- PLAN 5302.015: Planning Methods B
- PLAN 5500.06: Planning Studio 2
- PLAN 6500.06: Integrative Team Project
- PLAN 6505.03: Seminar: Theories, Ideas, Debates in Planning
- PLAN 9003.00: MASc/MPlan Thesis
- Graduate seminar in Engineering
- 4 classes in Engineering (12 credit hours)

Students in the joint degree programs will meet Department of Civil Engineering requirements through their elective credits. (In some cases, additional coursework may be required.)

Program of Study for Master of Planning

Year 1 - Term 1 (Fall)

- PLAN 5000.06: Planning Studio 1
- PLAN 5101.03: History and Philosophy of Planning
- PLAN 5102.03: Planning Practice
- PLAN 5301.015: Planning Methods A
- electives

Year 1 - Term 2 (Winter)

- PLAN 5104.03: Planning Law
- PLAN 5302.015: Planning Methods B
- PLAN 5500.06: Planning Studio 2
- electives

Year 1 - Term 3 (Summer)

- PLAN 5201.00: Work Term

Year 2 - Term 4 (Fall)

- PLAN 6000.09: Planning Project and Seminar
- electives

Year 2 - Term 5 (Winter)

- PLAN 6500.06: Integrated Team Project
- PLAN 6505.03: Seminar: Theories, Ideas, and Debates in Planning
- electives

Planning Electives

- PLAN 5005.03: Cities and the Environment in History
- PLAN 5012.03: Reading the City
- PLAN 5015.03: Site Infrastructure
- PLAN 5020.03: Landscape Design
- PLAN 5025.03: Representation in Design
- PLAN 5040.03: Reading the Suburbs
- PLAN 5050.03: Topics in Community Design
- PLAN 6101.03: History and Theory of Urban Design
- PLAN 6102.03: Urban Economics
- PLAN 6103.03: Urban Ecology
- PLAN 6105.03: Land Development Economics
- PLAN 6106.03: Transportation Planning
- PLAN 6107.03: Regional Planning
- PLAN 6108.03: History and Theory of Landscape Architecture
- PLAN 6111.03: Housing Theory
- PLAN 6150.03: Topics in Planning
- PLAN 6201.03: Directed Studies
- PLAN 6202.03: Directed Studies 2
- PLAN 6250.015: Field Trip: Maritimes
- PLAN 6255.015: Field Trip: International
- PLAN 6304.015 (to 6309.015) Mid-term Conference Module
- PLAN 6600.06: Special Project Studio
- PLAN 6601.06: Special Project Studio: Environmental Planning
- PLAN 6602.06: Special Project Studio: Urban Design

Note: Some senior undergraduate courses may be taken with the permission of the Graduate Coordinator.

- PLAN 3001.03: Landscape Ecology
- PLAN 3006.03: Reading the Landscape
- PLAN 3045.03: Community Design Practice
- PLAN 3055.03: Computers in Community Design and Planning
- PLAN 3225.03: Plants in the Human Landscape

Program of Study for Master of Planning Studies

The program consists of 30 credit hours taken over a period of not less than 12 months.

Sample Term 1 (Winter)

- PLAN 6505.03 Seminar in Theories, Ideas and Debates in Planning.
- RESEARCH METHODS COURSE (3 credit hours) appropriate to thesis as approved by thesis committee (e.g. from among
  - PLAN 5301.015, 5302.015 Planning Methods A and B
  - INTE 7100.03 Research Methods from management, policy and science
  - OCCU 5030.03 Advanced Research Theory & Methods for Occupational Therapy
  - ENVI 5001.03 Environmental Assessment
- Elective (3 credit hours) (where students satisfy the Methods requirement through previous course work. The student will take another 3 credit hours of electives.)

Sample Term 2 (Summer)

- PLAN 8000.06 MPS Thesis Proposal

Sample Term 3 (Fall)

- PLAN 9000.15 Masters of Planning Studies thesis.

VI. Class Offerings

Some required subjects may be interchanged between academic terms or years, depending on the availability of instructors. Many elective classes are not offered every year. The School attempts to schedule electives to be available at least once within a two year period; that is not always possible. Some classes have enrollment limits or pre-requisites.

Masters students taking classes that are cross-listed at the undergraduate level must register for the graduate level offering (5000 or 6000 level).

Other Electives

Students should discuss their elective choices with their faculty advisor.

Electives outside the School of Planning: up to half of the elective credits may be taken outside the School. All such choices need the approval of the Graduate Coordinator, and if the class is at another university, a Letter of Permission must be completed before enrolling in the class.

Undergraduate courses: up to two senior level (3000, 4000) undergraduate classes may be included in the program if comparable graduate classes are not available. Students need the permission of the Graduate Coordinator.

Directed Studies: no more than two Directed Studies classes may be included in the program.

VII.Class Descriptions

Class Numbers

Graduate courses are at the 5000 level and above. When classes are cross-listed with senior undergraduate classes, graduate students must enroll under the graduate number, and in such classes, the assignments and expectations are modified appropriately for graduate work.

PLAN 5000.06: Planning Studio 1.

The studio introduces land planning and development. The class investigates fundamental aspects of planning in community and environmental context in the urban region. Specific community projects are used to explore the procedural, physical, social and polemical context for decision making; to apply skills in information gathering, analysis, and synthesis; to develop communication techniques. The class will concentrate on documenting the existing situation, formulating strategies for intervention, developing concepts and plans, and assessing the consequences of proposed changes.
INSTRUCTOR(S): Guppy. S.
FORMAT: Studio/seminar (6 hours)
RESTRICTION: Master of Planning students or permission of instructor

PLAN 5005.03: Cities and the Environment in History.

The contemporary landscape reflects a long history of human activities on the land, and design and planning interventions through time. Civilizations rise and fall, often because of their degradation of the ecosystems that support them. This course examines the relationship of cities with the environment to enhance our understanding of landscape change, urban form and patterns in human settlements through the ages.
INSTRUCTOR(S): J. Grant
FORMAT: Lecture/seminar, 3 hours
CROSS-LISTING: PLAN 3005.03

PLAN 5012.03: Reading the City.

Any city reflects the history of its topography, cultural traditions, and design interventions. This course introduces the principles, theories, and methods of urban form analysis in the local urban context. Students explore the local urban environment to interpret what the city means, and how it comes to take the shape it does.
INSTRUCTOR(S): S. Guppy or L. McGovern
FORMAT: Lecture / Seminar
CROSS-LISTING: PLAN 3002.03

PLAN 5015.03: Site Infrastructure.

The course examines the role of infrastructure in community design and site planning. Students are introduced to principles of grading, access, service provision, and cost estimating. Key exercises allow students to apply theory to practical projects.
INSTRUCTOR(S): J. Zuck
FORMAT: Lecture/lab, 3 or 4 hours
CROSS-LISTING: PLAN 3015.03

PLAN 5020.03: Landscape Design.

The course introduces principles and methods of site design. It pays special attention to social, natural, and technical components as factors in adapting sites for human use. Practical projects allow students to develop deeper insight into the challenges and opportunities of landscape design.
INSTRUCTOR(S): J. Zuck
FORMAT: Lecture/lab, 3 or 4 hours
CROSS-LISTING: PLAN 3020.03

PLAN 5025.03: Representation in Design.

The course explores techniques of representation in community design work. It examines design drawing conventions such as orthographic, paraline, and perspective projections. It helps students develop their awareness of design approaches and their skills in design presentation.
INSTRUCTOR(S): A. Fillmore
FORMAT: Lecture / lab, 3 or 4 hours
CROSS-LISTING: PLAN 3025.03

PLAN 5040.03: Reading the Suburbs.

An increasing proportion of Canadians live in the suburbs. This course explores issues related to planning and designing the suburbs, and develops techniques for analyzing and developing community form in the suburban environment.
INSTRUCTOR(S): J. Grant
FORMAT: Lecture 3 hours
CROSS-LISTING: PLAN 3040.03

PLAN 5050.03: Topics in Community Design.

This course provides opportunities to examine selected topical issues in community design.
FORMAT: Lecture/Seminar
CROSS-LISTING: PLAN 3050.03

PLAN 5051.03: Topics in Community Design 2.

This course provides opportunities to examine selected topical issues in community design.
FORMAT: Lecture/Seminar
CROSS-LISTING: PLAN 3051.03

PLAN 5052.03: Topics in Community Design 3.

This course provides opportunities to examine selected topical issues in community design.
FORMAT: Lecture/Seminar
CROSS-LISTING: PLAN 3052.03

PLAN 5053.03: Topics in Community Design 4.

This course provides opportunities to examine selected topical issues in community design.
FORMAT: Lecture/Seminar
CROSS-LISTING: PLAN 3053.03

PLAN 5101.03: History and Philosophy of Planning.

The class offers an intensive examination of traditions, ideas, and philosophies that provide an underpinning to contemporary planning. The class traces the historic development of modern planning (since the late 19th century), and examines the philosophical foundations of the planning profession.
INSTRUCTOR(S): F. Palermo or J. Grant
FORMAT: Lecture/seminar, 3 hours
RESTRICTION: Master of Planning students or permission of instructor

PLAN 5102.03: Planning Practice.

The class explores the role of the planner and the planning process through lectures, seminars and case studies. The focus is on understanding the institutional framework for planning, including social, political, and economic dimensions; examining approaches to community involvement, negotiation, and policy formulation; and developing effective communication skills. It will consider significant current issues facing planners (including ethical questions).
INSTRUCTOR(S): B. Wishart
FORMAT: Lecture/seminar, 2 hours
RESTRICTION: Master of Planning students, or permission of instructor

PLAN 5104.03: Planning Law.

The course introduces the legislation, case law, and government authority applicable to planning and development control. Zoning and subdivision controls, development control, expropriation, planning appeals and the process of establishing and implementing plans will be examined. Attention is paid to the roles of all the primary players in planning: private citizens, special interest groups, corporations and municipal, provincial and federal government departments.
INSTRUCTOR(S): H. Epstein
FORMAT: Lecture/seminar, 3 hours
RESTRICTION: Master of Planning students, or permission of instructor

PLAN 5201.00: Work Term.

The work term provides an opportunity for student to integrate practical work experience within the educational environment. A student must complete a work term of not fewer than 500 hours over not fewer than 12 weeks in an employment placement approved by the School of Planning. The student maintains a work journal during the work term, and prepares a synthesis paper at the end of the work term reflecting on the lessons learned during the work term. The student makes a presentation within the School upon completion of the work term.
RESTRICTION: Master of Planning students

PLAN 5301.015: Planning Methods A.

The class introduces methods used in planning. This may include spatial analysis, population forecasting, survey methods, computer tools, and other appropriate techniques.
INSTRUCTOR(S): M. Poulton
FORMAT: Lecture/seminar, 3 hours
RESTRICTION: Master of Planning students or permission of instructor

PLAN 5302.015: Planning Methods B.

The class covers additional methods used in planning. This may include economic multipliers, spatial location analysis, research design, and other appropriate techniques.
INSTRUCTOR(S): M. Poulton, P. Manuel
FORMAT: Lecture, seminar, 2 hours
RESTRICTION: Master of Planning students or permission of instructor

PLAN 5500.06: Planning Studio 2.

The studio continues the lessons of Studio 1. The studio adopts an environmental perspective in approaching planning issues and challenges. The class will concentrate on techniques of evaluating the suitability of land for proposed land uses, and methods of assessing the impacts of proposed planning policies and developments on landscapes.
INSTRUCTOR(S): J. Zuck
FORMAT: Studio/seminar , 6 hours
PREREQUISITE: PLAN 5000
RESTRICTION: Master of Planning students or permission of instructor

PLAN 6000.09: Planning Project and Seminar.

Each student completes an independent planning project under the guidance of a project advisor, and participates in the weekly planning project seminar with the seminar leader. The class provides an opportunity for independent research and analysis in a community-based planning project context. The seminar provides an opportunity for reflection on the connections between theory and practice, and sets challenges and deadlines for project completion. Students present their work at several points during the term. Assessment is based on the project (75%) and seminar participation (25%).
FORMAT: Studio/seminar, 2 hours in class
PREREQUISITE: PLAN 5500.06, 5302.15

PLAN 6101.03: History and Theory of Urban Design.

The course introduces the history and theory of urban design as a distinct area of professional knowledge and skill within the spectrum of planning and design concerns and specialities.
INSTRUCTOR(S): F. Palermo
FORMAT: Lecture/seminar, 2-3 hours
CROSS-LISTING: PLAN 4101.03
RESTRICTION: Honors or graduate students in the Faculty of Architecture and Planning, or permission of instructor

PLAN 6102.03: Urban Economics.

The course applies economic principles to urban growth and structure, urban social and economic problems, and provision of services and government activities. The emphasis is on the use of micro economics and welfare economics to explain and analyze urban processes and patterns of behavior.
INSTRUCTOR(S): M. Poulton
FORMAT: Lecture/seminar, 2 hours
RESTRICTION: Graduate students in the Faculty of Architecture and Planning, or permission of instructor

PLAN 6103.03: Urban Ecology.

More than three-quarters of Canadians, and more than half the world's population, now live in urban settings. This course treats the urban system as habitat made by and for people, and takes an ecological approach to the flows of energy and materials which make urban life possible. Students study their own behavior and surroundings, comparing their observations with data from Canada, North America, and the rest of the world. This leads to discussions about the health and sustainability of urban communities.
INSTRUCTOR(S): S. Guppy
FORMAT: Lecture/seminar, 3 hours
CROSS-LISTING: PLAN 3010.03

PLAN 6105.03: Land Development Economics.

This course applies basic techniques for analyzing the financial feasibility of land development projects. Case studies focus particular attention on methods of financing and organizing real-estate development within the planning framework.
INSTRUCTOR(S): Staff
FORMAT: Lecture/seminar, 2 hours
CROSS-LISTING: PLAN 4105.03
RESTRICTION: Graduate students in the Faculty of Architecture and Planning, or permission of instructor

PLAN 6106.03: Transportation Planning.

This class analyses transportation trends, the transport needs associated with different activities and the impact of transport facilities on land development to offer a critical analysis of the interplay between land uses and transportation. Technology, the costs of supplying transport facilities and the demand outlook for different modes are examined. The emphasis is on urban transportation, mobility demands and the supply of efficient and environmentally sound transport facilities.
INSTRUCTOR(S): M. Poulton
FORMAT: Lecture/seminar, 2 hours
CROSS-LISTING: PLAN 4106.03
RESTRICTION: Graduate students in the Faculty of Architecture and Planning, or permission of instructor

PLAN 6107.03: Regional Planning.

The class critically examines policies, theories, aims and achievements of regional planning. The course discusses (i) economics, development theories, and regional development policies; (ii) international comparisons of regional development policies and experience; and (iii) Canadian regional development experience with particular reference to government initiatives in the Atlantic region.
INSTRUCTOR(S): M. Poulton
FORMAT: Lecture/seminar
CROSS-LISTING: PLAN 4107.03

PLAN 6108.03: History and Theory of Landscape Architecture.

The class deals with changing landscapes and perceptions of the natural world during the past 250 years. It discusses the effects of technology and resource use on the design of landscapes as small as a private garden and as large as a bio-region, and examines the changing role of landscape architects, their writings, and their collaboration with architects and planners.
INSTRUCTOR(S): S. Guppy
FORMAT: Lecture/seminar, 3 hours
CROSS-LISTING: PLAN 4108.03
RESTRICTION: Graduate students in the Faculty of Architecture and Planning, or permission of instructor

PLAN 6111.03: Housing Theory.

An introduction to the history and theory of contemporary practice in housing design and production. The focus is on the quality of housing and the residential environment. A comparative analysis of significant past and current examples is used to provide insight into the way houses and neighborhoods are designed. This understanding is placed in the context of differing economic, political and housing market situations.
INSTRUCTOR(S): J.G. Wanzel
FORMAT: Lecture/seminar, 3 hours
CROSS-LISTING: ARCH 6120.03, PLAN 4111.03
RESTRICTION: Graduate students in the Faculty of Architecture and Planning, or permission of instructor

PLAN 6150.03: Topics in Planning.

6151.03, 6152.03, 6153.03
This course provides opportunities to examine selected topical issues in planning in a seminar discussion.
INSTRUCTOR(S): Faculty
FORMAT: Seminar, 2 or 3 hours
CROSS-LISTING: PLAN 4150.03
RESTRICTION: Graduate students in the Faculty of Architecture and Planning, or permission of instructor

PLAN 6201.03: Directed Studies.

A student wishing to pursue an advanced aspect of planning study for which no suitable class is offered may request a Directed Studies. The class is taken under a School of Planning faculty member.
RESTRICTION: Master of Planning students or permission of Director of School of Planning

PLAN 6202.03: Directed Studies 2.

A student wishing to pursue an advanced aspect of planning study for which no suitable class is offered may request a second Directed Studies class. The class is taken under a School of Planning faculty member. No further directed studies are permitted.
PREREQUISITE: PLAN 6201.03
RESTRICTION: Master of Planning students, permission of Director of School of Planning

PLAN 6250.015: Field trip: Maritimes 1.

This intensive course involves a field trip within the Maritimes region to explore the current and historic state of planning in the region.
RESTRICTION: Master of Planning students

PLAN 6251.015: Field Trip: Maritimes 2.

This intensive course involves a field trip within the Maritimes region to explore the current and historic state of planning in the region.
RESTRICTION: Master of Planning Students

PLAN 6252.015: Field Trip: Maritimes 3.

This intensive course involves a field trip within the Maritimes region to explore the current and historic state of planning in the region.
RESTRICTION: Master of Planning Students

PLAN 6253.015: Field Trip: Maritimes 4.

This intensive course involves a field trip within the Maritimes region to explore the current and historic state of planning in the region.
RESTRICTION: Master of Planning Students

PLAN 6255.015: Field trip: International 1.

This intensive course involves a field trip to an international city to explore the current and historic state of planning in the city.
RESTRICTION: Master of Planning students or permission from the Director of School of Planning

PLAN 6256.015: Field Trip: International 2.

This intensive course involves a field trip to an international city to explore the current and historic state of planning in the city.
RESTRICTION: Master of Planning Students, or permission from the Director of School of Planning

PLAN 6257.015: Field Trip: International 3.

This intensive course involves a field trip to an international city to explore the current and historic state of planning in the city.
RESTRICTION: Master of Planning Students, or permission from the Director of School of Planning

PLAN 6258.015: Field Trip: International 4.

This intensive course involves a field trip to an international city to explore the current and historic state of planning in the city.
RESTRICTION: Master of Planning Students, or permission from the Director of School of Planning

PLAN 6304.015: 6305/ 6306/6307/6308/6309: Mid-Term Conference Module.

In the winter term the School offers an intensive conference module. The module is usually an intensive professional development workshop on an important contemporary planning theme. It brings together students, professional practitioners and high-calibre resource personnel. Students help to organize and run the conference, and complete assignments around the conference theme.
RESTRICTION: Graduate students in the Faculty of Architecture and Planning, or permission of instructor

PLAN 6500.06: Integrative Team Project.

In the final semester, students form small consulting teams to undertake complex planning projects for community, government or corporate clients. Projects and clients are selected by students and represent their wide range of interests. A common thread is the process to develop, document and communicate strategies and methods of implementation.
INSTRUCTOR(S): V. Spencer
FORMAT: Studio
PREREQUISITE: 6000.09

PLAN 6505.03: Seminar: Theories, Ideas, and Debates in Planning.

The final capstone course provides a venue for debate and discussion about theory, ethics, ideas, and contemporary issues in planning. It considers the relationship between theory and practice, and allows students to reflect on the profession they are about to join.
INSTRUCTOR(S): M. Poulton
FORMAT: Lecture/seminar
RESTRICTION: Restricted to graduate students in the Faculty of Architecture and Planning or permission of the instructor.

PLAN 6600.06: Special Project Studio.

The studio provides an opportunity for in-depth examination of a community-based planning project.
FORMAT: Studio/seminar
RESTRICTION: Graduate students in the Faculty of Architecture and Planning, or permission of instructor

PLAN 6601.06: Special Project Studio: Environmental Planning.

The studio provides an opportunity for in-depth examination of a community-based environmental planning project.
Note: Graduate students registering for this course need appropriate background in landscape analysis and environment planning.
INSTRUCTOR(S): J. Zuck or P. Manuel
FORMAT: Lecture/Lab/Studio
PREREQUISITE: PLAN 5500.06 and permission of instructor
CROSS-LISTING: PLAN 4001.06
RESTRICTION: Graduate students

PLAN 6602.06: Special Project Studio: Urban Design.

The studio provides an opportunity for in-depth examination of a community-based urban design project.
INSTRUCTOR(S): F. Palermo
FORMAT: Lecture/Lab/Studio
PREREQUISITE: PLAN 5500.06
CROSS-LISTING: PLAN 4002.06
RESTRICTION: Graduate students in the Faculty of Architecture and Planning, or permission of instructor.

PLAN 8000.06: MPS Thesis Proposal.

Under the supervision of the thesis supervisor and thesis committee, a student in the Master of Planning Studies program prepares a thesis proposal that outlines the research question, background literature review and synthesis, approach, methods (of data collection and analysis), ethical implications, and schedule of work. The student gives a public presentation of the thesis proposal, and an oral defence before the thesis committee.
FORMAT: Self-directed project
PREREQUISITE: Admission to Master of Planning Studies program

PLAN 9000.15: Master of Planning Studies Thesis.

Under the supervision of the thesis supervisor and thesis committee, a student in the Master of Planning studies program prepares a thesis that investigates an original and significant question in planning research. The student gives a public presentation of the thesis research, and an oral defence of the thesis before the thesis committee.
FORMAT: Self-directed research thesis
PREREQUISITE: Admission to the Master of Planning Studies program, PLAN 8000
RESTRICTION: Limited to students in the Master of Planning Studies Program

PLAN 9003.00: MASc/MPlan Thesis.

In the final term of the MASc/MPlan program, each student must complete a written thesis. The thesis is guided by a committee which consists of at least one full-time faculty member from the School of Planning and one from the Department of Civil Engineering. The thesis must conform to the standards described in “Guide for the Preparation of Graduate Theses”, prepared by the School. The thesis is examined by the thesis committee and an external examiner approved by the two departments. The student is required to make an oral defence of the thesis.
PREREQUISITE: PLAN 5500.06
RESTRICTION: MASc/MPlan students

PLAN 9004.00: Continuation - MURP Thesis.

Continuation of PLAN 9001.00.
RESTRICTION: MURP students

PLAN 9006.00: Continuation - MASc/MPlan Thesis.

Continuation of PLAN 9003.00.
RESTRICTION: MASc/MURP or MPlan students.

PLAN 9010.00: MPS Thesis Continuation.

When a thesis committee grades the course Plan 9000.15 as "In Progress", the student registers for Plan 9010.00 each fall and winter semester until the thesis is successfully defended and completed.
FORMAT: Thesis research and writing continues
PREREQUISITE: Plan 9000 graded as IP
RESTRICTION: Limited to students in the Master of Planning Studies program who have earned IP in Plan 9000.15

PLAN 9102.09: MENG/MPlan Project.

Each student in the MEng/MPlan program must complete a project that meets the requirements for both planning (see PLAN 6000.09) and engineering. The project is guided by a committee, which consists of at least one faculty member from the School of Planning and one from the Department of Civil Engineering. The student participates in and meets the requirements of the Planning project seminar.
FORMAT: Studio and weekly seminar
PREREQUISITE: PLAN 5500
RESTRICTION: MEng/MPlan students

Political Science

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Chairperson of Department

Finbow, R.G.

Graduate Co-ordinator

Carbert, L.

Professors Emeriti

Beck, J.M., BA (Acadia), MA, PhD (Toronto), LLD (Dal), FRSC
Braybrooke, D., BA (Harvard), MA, PhD (Cornell), FRSC
Cameron, D.M., BA (Queen's), MA, MPhil, PhD (Toronto). Canadian federalism and intergovernmental relations; Canadian public policy; city government
Eayrs, J.G., BA (Toronto), AM, PhD (Col), FRSC
Stairs, D., BA (Dal), MA (Oxon), PhD (Toronto), FRSC, OC. Canadian foreign policy; foreign policy process
Winham, G.R., BA (Bowdoin), Dip Int Law (Manchester), PhD (N Car), FRSC, Eric Dennis Memorial Professor of Government and Political Science. International relations and diplomatic practice; international political economy; U.S. Foreign policy; Canada-U.S. relations

Professors

Aucoin, P.C., BA (SMU), MA (Dal), PhD (Queen's) (Eric Dennis Memorial Professor of Government and Polictical Science), FRSC; jointly with Public Administration. Public administration (policy processes, government organization, management systems); Canadian political institutions
Black, D., BA (Trent), MA, PhD (Dal). Canadian & comparative foreign policy; Southern Africa; North-South relations
Boardman, R., BSc, PhD, DSc (London). International organization, European Politics, Environment
Davis, J., BA (Oberlin), MA, PhD, (Johns Hopkins (SAIS)). Business-government relations; public policy; oil and gas policy; international political economy and monetary affairs, rational choice theory.
Fierlbeck, K., BA (Alta), MA (York), PhD (Cantab). Political theory, Modern and Post-modern; Distributive justice
Finbow, R.G., BA (Dal), MA (York), MSc, PhD (London). Comparative politics (Western democracies [Latin America]); Comparative theory; Canadian regionalism
Harvey, F., BA, MA, PhD (McGill). Theories of international relations; International conflict and crises; comparative foreign policy; empirical research methods
Laursen, F., Cand. Scient.Pol(Aarhus Univ), PhD, (Penn). International Politics, European Studies
Middlemiss, D.W., BA, MA, PhD (Toronto). Canadian defence policy (especially defence economies and Maritime strategy); Canadian foreign policy
Smith, J., BA (McMaster), MA, PhD (Dal). Canadian government and politics; American government; Modern liberal theory

Associate Professor

Carbert, L., BA (Alta), MA, PhD (York). Political theory; Canadian political behaviour; feminist theory

Assistant Professors

Arthur, P., BA (Ghana), MSc (LSE), MA (WLU), PhD (Queen's), Comparative Politics (African Politics), Development, Foreign Policy
Bow, B., BA (UBC), MA (York), PhD (Cornell), International Relations; International Diplomacy and Institutions; International Political Economy; Foreign Policy; Canada-US Relations
Good, K., BA, MA (Man), PhD, (Toronto). Urban and suburban governance in Canada, Canadian federalism and multi-level governance, Canadian public policy, race relations in Canada
Turnbull, L., BA, MA (Dal), PhD, (Dal). Canadian Politics with specific focus on ethics, parliament, and citizen engagement

Adjunct Professors

Biro, A., Acadia University
Brown, S., University of Ottawa
Haydon, P., Dalhousie University
Heard, A., Simon Fraser
Kow, S., University of King's College
Legler, T., Mount Allison University
Martin, G., Mount Allison University
Pyrcz, G., Acadia University
Robertson N., University of King's College
Shaw T., Royal Roads University
Smith H., University of Northern British Columbia
Sutherland S., Queen's University

I. Admission Requirements

Applicants must satisfy the minimum requirements set by the Faculty of Graduate Studies.

Successful applicants for the MA program will have an Honours BA in Political Science, or its equivalent, with first-class or high second-class standing (GPA of 3.30 or higher).

Admission decisions are based on academic transcripts, letters of reference, a sample of written work, statement of research interest submitted by the applicant, and the capacity of the Department to supervise a thesis in the applicant's proposed field of research.

Successful applicants for the PhD program will have an MA in Political Science with first-class standing (GPA of 3.70 or higher). Admission decisions are based on the same considerations as apply to the MA program, but PhD students are admitted only when a faculty member is prepared to supervise the applicant's program, including the proposed thesis topic.

Applicants who do not meet all of the above requirements, but who have superior academic qualifications, may be considered for admission to the MA or PhD programs, but may be required to satisfy additional requirements within the program. All such requirements will be specified at the time of admission.

Applicants whose native language is not English must demonstrate a minimum TOEFL score of 600, or the equivalent score on a comparable test.

II. Degree Programs

A. Master of Arts (MA)

The MA is a one-year (12 month) program consisting of three full-credit classes (or the equivalent in half-credit classes) and a thesis. Classes include at least two of the core graduate seminars, other graduate classes (including directed reading classes and graduate classes in other departments), and not more than one credit of classes cross-listed as undergraduate/graduate (3000/5000). The MA may be completed on a full-time or part-time basis.

B. Doctor of Philosophy (PhD)

The PhD program requires two years of full-time residency, and can be completed in three to four years. The two principal requirements consist of comprehensive examinations in two fields (a major and minor field) and an original thesis. Class work will be required as appropriate to prepare the student for her or his comprehensive examinations. These

examinations will include both written and oral components. Before proceeding to the thesis, a student must present and defend a thesis proposal. Also, reading competence in a second language, usually French, must be demonstrated before the student begins work on the thesis. The thesis is written under the direction of a committee comprising the supervisor and two other members, and may include qualified faculty members from other departments and other universities. The completed thesis is subject to a public, oral defence.

III. Class Descriptions

Classes offered by the Department are organized into four fields, as follows:

- Canadian Politics
- Comparative Politics
- Political Theory
- International Relations and Foreign Policy

Each field (with the exception of Political Theory) contains classes offered as core graduate seminars, and classes cross-listed at the undergraduate/graduate level. The latter usually contain a majority of undergraduate students, and graduate students will be required to satisfy appropriately higher standards. In addition, directed reading classes may be arranged on an individual or small group basis with appropriate faculty members. This will often be particularly appropriate in areas closely related to a student's thesis research, in conjunction with the thesis supervisor.

Not all classes are offered every year. A more accurate timetable will be available in the spring of each year.

A. Canadian Government and Politics

Core Graduate Seminar:

POLI 5204X/Y.06: Advanced Seminar in Canadian Politics.

This class examines the major dimensions of Canadian government and politics. The first term is devoted to the institutions, processes and dynamics of the federal system of government. Topics in the first term include responsible government; party government; electoral system; legislative processes; senate; cabinet; pressure groups; crown corporations and regulatory agencies; accountability; charter or rights; media. Topics in the second term include the ideas of interstate and intrastate federalism; judicial interpretation and the Supreme Court; executive federalism; federal-provincial fiscal arrangements; the 1982 constitutional amendments, and the current constitutional process. This class will be conducted as a seminar. We first consider the principal subjects by way of general class discussion. We spend the rest of the term discussing student papers on the assigned topics.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
FORMAT: Seminar 2 hours

Cross-listed Classes:

POLI 5205.03: Canadian Political Thought.

This class addresses philosophical issues that play a major role in contemporary Canadian politics. These include minority rights and multiculturalism; nationalism, federalism, and self-determination; and citizenship and the politics of identity. Approved with Canadian Studies.
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3205.03

Elective (3 credit hours)

POLI 5206.03: Constitutional Issues in Canadian Politics.

These are political issues that possess an important constitutional dimension. They include judicial review and the role of the Supreme Court of Canada, constitutional amendment, the representation formula, the Charter of Rights and Freedoms, language rights and the Crown.
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3206.03

Elective (3 credit hours)

POLI 5220.03: Intergovernmental Relations.

This class will examine the territorial division of political and administrative power and the nature of relations between governments which result from such a division of power, including federal-provincial-municipal or "tri-level" relations. Specific topics will include the role of the courts in constitutional interpretations, the instruments of "fiscal federalism' (including equalization payments, conditional grants, tax sharing arrangements and shared cost programs), administrative relationships and the concept of "executive federalism"
These themes will be pursued further by each student through the preparation of a research paper. This paper will deal with a policy area selected by the student (transportation, education, health, etc.) And will provide an opportunity for a more intensive examination of the impact of intergovernmental relations, on public policy and vice versa. For additional information about class requirements, please consult the instructor.
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3220.03

Elective (3 credit hours)

POLI 5224.03: Canadian Political Parties.

The Canadian party system, viewed as an integral part of the entire political system, presents a number of interesting questions for exploration, such as the alleged fickleness of voters, the role of party leaders, and the manner in which parties contribute to Canadian democracy. The particular themes emphasized will vary from year to year. Approved with Canadian Studies.
FORMAT: Lecture and discussion 2 hours
CROSS-LISTING: POLI 3224.03

Elective (3 credit hours)

POLI 5228.03: Interest Groups: Function and Management.

This class will attempt a systematic examination of the function and management of interest groups in Canada and, to a lesser extent, other western countries. It will begin by considering the functions such groups perform for their supporters on the one hand and, on the other, the role they play in 1) maintaining political systems; 2) securing and modifying public policy, and 3) implementing programs. It will explore the ways in which their structures and behavior patterns vary according to the resources of the groups themselves, the nature of their concerns and the demands of the political/bureaucratic systems in which they operate. An important feature of the class will be a discussion of the internal management of groups. This discussion will include a review of how membership is secured and retained and how group resources are obtained and applied; the role of professional staff in developing group positions and in interacting between the interest group and government officials. In conclusion, the class will examine the role of interest groups in policy processes and the relationship between that role and the prospects for democracy in western politics. Approved with Canadian Studies.
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3228.03, PUAD 6505.03

Elective (3 credit hours)

POLI 5231.03: Urban Governance in Canada.

Despite the fact that most Canadians live in cities, municipal governments are junior partners in Canadian federalism. Municipal, business and community leaders in urban centers are advocating new relationships among municipal and upper levels of government - they want a "New Deal for Cities". The objective of this course is to provide students with the analytical, theoretical, and methodological tools to understand and explain the politics and policy activities of Canadian municipalities within their historical, institutional, and constitutional framework. In this class, we adopt a critical perspective on urban governance and engage with contemporary debates concerning municipal governance reform, the evolving nature of urban governance within Canadian federalism, and social science debates concerning how we ought to study cities.
FORMAT: Seminar, 2 hours
CROSS-LISTING: POLI 3231.03

Elective (3 credit hours)

POLI 5233.03: Canadian Political Economy.

This seminar class, for graduates and senior undergraduates, will explore the relationship between politics and economic life in Canada. Canada's economic development, the role of the state, imperial and continental relationships, the debate over free trade, economic nationalism, and Canada's place in a global economy will be analyzed. Students will consider staples, liberal Keynesian and neo-classical, socialist and feminist perspectives. Other topics include women, trade unions, native and immigrant communities, and the impact of economic forces on national unity. Students will debate controversial themes on each topic. Student essays will explore a range of contemporary issues including the debt crisis, federal-provincial fiscal relations, the economic consequences of Quebec separation, regional development programs, and policies for industrial development, human resources, technological change, poverty and inequality, etc.
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3233.03

Elective (3 credit hours)

POLI 5235.03: Regional Political Economy in Canada.

The class surveys the interaction between politics and economics in Canada with emphasis on the question of regional development. It will canvas competing explanations for differences in economic development among Canada's regions with special emphasis on Maritime economic problems, highlighting both the political sources of regional disparities and continuing efforts to rectify them. Distinctive Western, Quebec and Ontario concerns will also be covered. Seminars, for graduates and senior undergraduates, will feature students presentations and research projects.
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3235.03

Elective (3 credit hours)

POLI 5240.03: Introduction to Public Policy.

A comprehensive examination of the three critical questions in the This class provides a general introduction to the field of policy management, for graduate and honors undergraduate students. Using British 'best practice' ideas of professional policy making and Canadian statements of generic policy competencies, it seeks to improve the policy capacity of participants. It does this first by increasing their knowledge of public policy structures, processes, and outputs, and secondly, by giving them knowledge that they can use in policy advocacy both inside and outside government. The first section of the class examines policy definitions and professional policy making approaches in the 21st century. The second section considers the role of the state in the 21st century, and the policy competencies that analysts must have if that role is to be carried out effectively. Section three explores vertical, horizontal and external policy relationships, both as determinants of policy and as practical matters of management. Section four explores, and helps participants to gain proficiency in, the most recent processes of strategic policy design and implementation. This blend of theory and practice will increase the policy knowledge of all participants, and equip those who are in professional programs, including the various public services, to contribute more effectively in policy processes in the future.
CROSS-LISTED: POLI 4240.03/PUAD 5120.03
FORMAT: Seminar 2 hours

Elective (3 credit hours)

POLI 5241.03: Introduction to Policy Analysis.

This class examines four aspects of policy analysis: 1) the role of the analyst in modern government; 2) the analyst's working environment; 3) techniques used in carrying out research and preparing position papers; 4) and the analyst's responsibilities to government and to the public in determining what information should reach decision-makers. Approved with Canadian Studies.
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3241.03, PUAD 5121.03

B. Comparative Politics

Core Graduate Seminars:

POLI 5301.03: Comparative Theory.

This class examines two levels of theory utilized in the study of politics in different nations: 1) the major paradigms or approaches to political analysis, notably debates over methodology and knowledge, the nature of the state, etc.; 2) selected theoretical tools used to analyze specific elements of the political process, notably interest group and media influence, political culture and socialization, electoral and revolutionary regime change, political development and economic dependency, etc. The list of topics is subject to revision depending on the students' backgrounds and interests.
FORMAT: Seminar 2 hours

POLI 5340.03: Approaches to Development.

A survey of theories of and policies about dependence, underdevelopment and peripheral social formations. particular emphasis on modernization and materialist modes of analysis, and on orthodox and radical strategies of development. Topics treated include social contradictions (e.g. class, race and ethnicity), debt, structural adjustment, (de)industrialisation, self-reliance, human development, gender, technology, civil society, informal sectors, authoritarianism and ecology.
FORMAT: Seminar 2 hours

Cross-listed Classes:

POLI 5302.03: Comparative Development Administration.

Some analytical and normative issues of public administration in developing countries are examined including the scope of development administration as a sub-field of public administration; public sector organization and management including public services, public enterprises, decentralization and rural development, financial systems, human resources management, aspects of state economic management with Japanese and South Korean case studies; and institutional aspects of aid administration with CIDA and World Bank cases.
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3302.03

POLI 5303.03: Human Rights and Politics.

This class will introduce students to the evolving place of human rights in politics, both comparative and international. We begin by examining the historic emergence of human rights as an issue in world politics, principally since the Second World War; and by considering both the philosophical foundations of the idea of human rights and some of the main controversies concerning their scope and application. We then focus on a number of specific topics and controversies concerning human rights in world politics, including: the sources of and struggle to end human rights abusive regimes in Latin America; the multilateral politics of human rights; human rights in national foreign policies, with a specific focus on the challenges posed by China; Islam and human rights; genocide and humanitarian intervention; and efforts to foster justice and reconciliation in the aftermath of abusive regimes. Finally we look specifically at the role of human rights in domestic politics, focusing on the issues of women's rights and sexual orientation.
FORMAT: Seminar, 2 hours
CROSS-LISTING: POLI 3303.03

POLI 5304.03: Comparative Federalism.

A seminar class which examines the theory and practice of federalism within a comparative framework. The actual federations discussed depends in part on student interest but usually includes both established federal nations and those moving in that direction.
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3304.03, PUAD 6755.03

POLI 5311.03: Sports and Politics.

This class examines the role of sport in domestic, transnational and international politics. It addresses the gap in much of mainstream political science concerning the pervasive influence of popular cultural trends and practices on political relations. Some topics include: the role of sport in political socialization and the creation of national identity; the politics of the Olympic Games, and sport and political change in South Africa.
FORMAT: Seminar, 2 hours
CROSS-LISTING: POLI 3311.03

POLI 5315.03: African Politics.

The diversity of states, politics, economy and society in post-colonial sub-Saharan Africa is examined in this seminar. Topics include theoretical approaches, economic frameworks, governmental regimes, structural adjustments, civil society, and intra-regional political economies, and selected aspects of policy such as economic reform, political liberalization, women and development, drought and ecology, AIDS and health
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3315.03

POLI 5322.03: The EU as a Global Factor.

The aim is to enable the student to analyze and understand the international roles played by the EU in both economic and political areas. Why has the EU been better able to speak with one voice in economic areas than political areas? To what extent can the member states control the foreign policies of the EU? The introductory part will include an overview of the EU governance systems in the area of external economic relations (first pillar) and the Common Foreign and Security Policy (the second pillar) and analyses of the main achievements in both areas. Specific topics to be selected for analyses during the second part will include the EU and the WTO, the EU and the US, the EU and East Asia, and the EU and developing countries. Finally, in the third part of the course students study recent efforts to develop a European Security and Defense Policy.
FORMAT: Seminar, 2 hours
CROSS-LISTING: POLI 3322.03

POLI 5323.03: Treaty Reforms in the EU.

The course covers the treaties founding the European Communities (Treaty of Paris, 1951 and Treaties of Rome 1957) and the reforms of these treaties in the Merger treaty (1965), the budget treaties (1970 and 1975), the Single European Act (1987), the Treaty of Maastricht (1992), the Treaty of Amsterdam (1997), the Treaty of Nice (2001) as well as the Constitutional Treaty (2004). How are these successive treaties negotiated? Why has the Ec/EU gone through so many treaty reforms? Is there a particular trend in the reforms? Which theories can help us to understand the changes?
FORMAT: Seminar, 2 hours
CROSS-LISTING: POLI 3323.03

POLI 5325.06: European Politics.

The comparative study of politics in European countries gives a useful perspective on Canadian politics. Focusing primarily on western Europe, this class examines party politics, government institutions, contemporary public policy issues, and related topics in selected European states. Discussion of the politics of the European Union is an integral part of the class.
FORMAT: Seminar
CROSS-LISTING: POLI 3325.06

POLI 5345.03: Politics of Southern Africa.

This class focuses on political change in the Southern African region since the end of colonialism. It compares the experience of the various countries in the region to development and security pressures related to the legacies of colonialism, persistent economic problems and recent structural adjustments, environmental degradations and threats, ethnic, class and gender cleavages, strategic and social problems related to first apartheid and later post-apartheid transitions, issues of governance and regional conflict as well as more positive trends that towards abatements in civil wars and a surge of democratization. As well as country comparisons, the class will look at the region as a political unit, exploring the opportunities for and constraints against formal regional cooperation on economy or security as well as informal processes that constitute the basis of "new" regionalism forces.
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3345.03

POLI 5350.03: Governance and Globalization.

This seminar class provides students with an opportunity for critical evaluation of the reshapings of political processes and institutions that are occurring as the result of globalization. The class will explore the concept of governance in the context of changing dynamics related to the trans-nationalisation of production and increased capital mobility as well as the rise in numbers and influence of NGOs and new social movements. "New" forms of governance emerging out of decentralisation and/or disinvestment of state authority and supra-national arrangements that are broadly captured within the concept of "global governance" will be explored along with traditional concepts of governance that center on the actors, structures and environments of governmental policy-making. A range of issues will be examined: governance of economies, environment, communications, human rights, health, conflict and complex emergencies within the context of theoretical debates involving the "internationalization" of the state; the role of identities, e.g., nationalist, ethnic, gender, cosmopolitan; the growing relevance of regionalism and the nature of and prospects for democracy and citizenship.
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3350.03

POLI 5360.03: Politics in Latin America.

This seminar class surveys the politics of Latin American states colonial to contemporary times. Students first examine political history and development, focusing on particular challenges of colonial inheritance, military politicization, modernization, development and dependency and international interference. Institutions, public policies, and state-society relations are then discussed. Other topics include women and indigenous people and prospects for durable democratization. Students will debate controversial questions on each topic.
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3360.03

POLI 5379.06: U.S. Constitution, Government, and Politics.

The purpose of this seminar class is to gain a thorough and critical understanding of American political process. To this end, a series of topics are examined, beginning with a framing of the constitution and concluding with questions about political culture. These is considerable emphasis on formal and informal political institutions, especially political parties and elections.
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3379.03

C. Political Theory and Methodology

Core Graduate Seminar:

POLI 5401.03: Contemporary Political Thought.

How ought we to evaluate the political norms and beliefs, which we hold as we enter the next millennium? This class provides a conceptual overview of contemporary political thought from the development of 20th century liberal democracy to the contemporary criticisms articulated by its opponents. Topics to be discussed include: liberal and "non-liberal" democracy, justice and distribute justice; liberty and libertarianism; rights; property and theories of entitlement; virtue and citizenship; identity and community; race and representation; epistemology (including feminist epistemology), public choice theory, and postmodernism.
FORMAT: Lecture/seminar
CROSS-LISTING: POLI 3401.03

POLI 5475.03: Democratic Theory.

Democracy is an essential component of legitimacy for all western states: few would be inclined to assert their "undemocratic" nature. But what are the essential characteristics of democracy; and to what extent must modern democratic theory remain grounded in nineteenth-century western liberal thought? While this class has a predominantly theoretical orientation, it will include an examination of the relations between democratic theory and economic production/redistribution; as well as an

investigation into how democratic theory can be developed in non-western political contexts.
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3475.03

POLI 5479.03: Classical Liberalism and Democracy.

Liberalism takes a variety of forms and includes many topics including the rule of law, limited government, the free exchange of goods, entitlement to property, the self, and individual rights. Its philosophical and political assumptions provide the intellectual context within which its account of the individual, its vision of the community and its preferred allocation of resources will be assessed.
FORMAT: Seminar 2 hours
CROSS-LISTING: PHIL 4470.03/5470.03, POLI 4479.03, ECON 4446.03/5446.03

D. International Relations & Foreign Policy

Core Graduate Seminar:

POLI 5520X/Y.06: Theories of International Relations.

A survey of the discipline of international relations. Topics include the role of theory, structure and operation of the international system, balance of power, international economics and problems of dependence, war and problems of international security, international organization and the nation-state.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
FORMAT: Seminar 2 hours

Cross-listed Classes:

POLI 5521.03: Building Peace and Democracy.

This course examines the elements of democracy and the steps that are required for post-conflict countries to attain it. Students will learn about new security issues, institutions of governance, and the elements of peacebuilding.
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3520.03

POLI 5525.03: Comparative Foreign Policy Simulation.

This class is designed for advanced (i.e., 3rd/4th year) undergraduate and graduate students in Political Science. Once students become familiar with basic concepts, theories and decision-making frameworks developed within the sub-field of comparative foreign policy (part I), they will be expected to apply what they have learned through participation in an interactive computer simulation involving other teams throughout North America (and possibly Europe). As they attempt to implement policy initiatives and work in teams to resolve international disputes, students will confront foreign policy issues in a context that provides an authenticity of experience. The objective is to enable students to create and test organizational skills, understand the interdependence of international issues, appreciate cultural differences and approaches to world problems, and use computers for multination communications.
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3525.03

POLI 5531.03: The United Nations in World Politics.

The evolution of the United Nations from its early concentration on problems of collective security, through the period of preventative diplomacy and anti-colonialism to its present role as a forum for the aspirations and demands of the Less Developed Countries is reviewed. The more distant future, and the continuing relevance of the United Nations in world politics, and how its role and objectives should be determined, are considered.
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3351.03

POLI 5535.03: The New International Division of Labor.

This seminar provides an overview of the global political economy in the current post-Bretton Woods and Cold War period. It treats the New International Division of Labor/Power from several theoretical and political perspectives, from comparative foreign policy to feminism. Issues addressed include the Newly Industrializing Countries, the Middle Powers and the Fourth World; new functionalism; popular participation; and alternative futures.
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3535.03

POLI 5540.03: Foreign Policies in the Third World.

This seminar offers a comparative perspective on the political economy of foreign policy in Africa, Asia, the Middle East, and South America at the end of the twentieth century. Its focus is how such state and non-state actors in the South relate to the New International Divisions of Labor and Power given the demise of both Bretton Woods and Cold War global regimes. In addition to selective case studies of both large and small states -- from Brazil, India, Indonesia, and Nigeria to Botswana, Jamaica, Kuwait, and Singapore -- it treats formal and informal external relations, from regional intergovernmental institutions to non-governmental coalitions. It also examines new forms of regional conflict and cooperation, including guerrilla struggles and civil societies. It emphasizes the incidence and impact of structural adjustment programs and conditionalities along with the emergence of "new" issues such as debt, democracy, ecology, gender, refugees, and technology. A range of alternative approaches is identified and evaluated appropriate to the contemporary period of revisionism.
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3540.03

POLI 5560.03: Human Development/Security at the Start of the Twenty-first Century.

This senior undergraduate/graduate seminar is designed to present current definitions of and debates about human development/human security at the turn of the century. These have both analytic and policy relevance for a wide range of actors in contemporary global politics: not just states/international organizations but also civil societies & private companies, think tanks and partnerships. It is offered in summer school to attract a diverse, interdisciplinary range of registrants and to coincide with the annual weekend workshop of the "new regionalisms" network which treats an issue of relevance to global development each year, such as new regionalisms in August 2000 and globalizations in 2001.
FORMAT: Seminar
PREREQUISITE: Offered as a summer class only. Consult instructor.
CROSS-LISTING: POLI 3560.03

POLI 5570X/Y.06: Canadian Foreign Policy.

The seminar examines post-World War II Canadian foreign policy in three parts: (1) a detailed analysis of major policy developments, using the case-study approach; (2) an investigation of selected recurrent and contemporary themes, issues, and problems, and (3) an investigation of the general factors that may help to "explain" the form and content of Canadian foreign policy, with particular reference to the institutions and processes through which policy decisions are made. The primary emphasis is on politico-security issues, although other subjects are also considered.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
FORMAT: Writing Intensive, seminar 2 hours
CROSS-LISTING: POLI 3570X/Y.06

POLI 5571X/Y.06: Strategy and Canadian Defense Policy.

This seminar examines post-World War II Canadian defense policy in three parts: 1) an analysis of important cases of policy development; 2) an investigation of certain persistent themes and current issues (e.g., Canada-U.S. defense relations; defense funding; weapons procurement; the role of women in the forces; civil-military relations, etc.; and 3) an assessment of the major determinants of policy and prescriptions for the future.

NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3571.X/Y.06

POLI 5574.03: American Foreign Policy.

This class considers why Americans make the kind of foreign policy they do. The class will examine the trilateral relationship between society, government and the military in the post-Cold War era. the context includes: changing societal values and the domestic pressures they produce; and the implications of a constantly changing strategic environment. Different perspectives will be examined to assess the implications for civil-military relations of the above-noted changes; legal/constitutional (Charter challenges); military/professional (operational requirements); and political (constituency and special interest demands) policy they do and the decision process and relevant methodologies for examining decision strategy are examined. Students develop an ability to explain foreign policy decisions of the United States.
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3574.03

POLI 5575.03: Nuclear Weapons and Arms Control in World Politics.

The seminar examines the technological, doctrinal, and political aspects of the nuclear weapons "problem" and the arms control "solution". It also assess the fate of contemporary nuclear arms control efforts.
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3575.03

POLI 5577.03: Civil-Military Relations in Contemporary Western Society.

The class will examine the trilateral relationship between society, government and the military in the post-Cold War era. The context includes: changing societal values and the domestic pressures they produce; and the implications of a constantly changing strategic environment. Different perspectives will be examined to assess the implications for civil-military relations of the above-noted changes; legal/constitutional (Charter challenges); military/professional (operational requirements); and political (constituency and special interest demands).
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3577.03

POLI 5581.03: Diplomacy and Negotiation.

This class examines the practice of diplomatic negotiation in international relations. Attention is directed towards historical development and change in diplomatic practice, and to the nature and role of negotiation in the contemporary international system. Various examples of diplomatic negotiations are studied, ranging from bilateral negotiations such as nuclear arms talks or the Canada-US Free Trade Agreement, to multilateral negotiations as the UN Conference of the Law of the Sear or GATT negotiations. Students are expected to participate in a simulation exercise and to prepare a term paper or selected case of international negotiation.
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3581.03

POLI 5587.03: International Political Economy.

This course is composed of two overlapping constituent themes. The first theme is that of competing explanations of international political economic behavior - behavior affected by that diffuse political authority characteristic of the international system, the second, that of examining the basic issues in international political economy - the fundamental questions as to why international trade, international finance, unequal economic development, international organization, and the multinational enterprise. The first theme functions to create the over-all framework of analysis by which competing approaches to international political economy can be evaluated. The second theme will integrate these approaches with issue areas within the fields of international trade, international finance, and what might be termed "international production" (within which fields issues such as economic development, the multinational enterprise, and the global "division of labor" constitute the major foci). The course sessions will roughly be constituted by 50 percent lecture and 50 percent organized student contributions for seminar discussion and debate.
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3587.03

POLI 5636.03: Nationalism and Statecraft.

An examination of the sources, ingredients and consequences of contemporary nationalism, with particular reference to its implications for the conduct of international politics. In the early sessions of the class, pertinent literature from the pre-World War II period will be evaluated for its relevance to our understanding of current circumstances, in which the apparent revival of nationalist impulses has coincided with intensifying manifestations of functional interdependence. The balance of the class will be devoted to case-studies.
FORMAT: Seminar
CROSS-LISTING: POLI 4636.03

POLI 5656.03: Oil, Natural Gas and Government: The Political Economy of Regulation.

Given that oil and natural gas activities are vital both for internal Canadian energy consumption and for an increasing fraction of Canadian energy exports to the United States, the conjoint management of these activities by the private and public sectors is of considerable importance. This course is designed to give students interested in issues related to oil and natural gas, natural resource exploitation, and public policy and administration, an understanding of how oil and gas activities are manager.
FORMAT: Seminar
CROSS-LISTING: POLI 4656.03

E. Directed Reading Classes

Graduate students taking directed reading classes register under one of the following designations, depending on whether the class extends for the first term, the second term, or the full academic year:

POLI 5601.06: Readings in Political Science.

POLI 5602.03: Readings in Political Science.

POLI 5603.03: Readings in Political Science.

F. Thesis

Students register for the thesis under the appropriate designation, as follows:

POLI 9000.00: MA Thesis.

POLI 9530.00: PhD Thesis.

Process Engineering and Applied Science

- **Biological Engineering**
- **Chemical Engineering**
- **Food Science**
- **Materials Engineering**

Department Head

Pegg, M.J., BSc, PhD (Leeds), PEng. Combustion, safety and loss prevention

Graduate Coordinator

Ghaly, A.E., BSc (Alexandria), MSc (Alexandria), PhD (McGill), PEng. Environmental Biotechnology, Industrial ecology, bioremediation, phytoremediation, fermentation technology, energy conversion.

Graduate Secretary

Joann Scott
Location: D Building, 4th Floor
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Halifax, Nova Scotia
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Website: http://engineering.dal.ca/DEPARTMENTS/PEAS-Graduate_Progra.php

Professors Emeriti

Ackman, R.G., BA (Toronto), MSc (Dal), DIC (Imperial Coll), PhD (London), LLD (Hon) (Dal). Head of the Marine Oils Group at CIFT. Edible fats and oils, particularly fish oils, omega-3 fatty acids & the uptake of hydrocarbon pollutants into fish tissue.
Chen, B.H., BSc (Nat. Taiwan), MEng, PhD (McGill), PEng
Hancock, H.A., BASc, MASc, PhD (Toronto), PEng
McMillan, A.F., BSc, MSc (Queens), PhD (MIT), PEng

Professors

Amyotte, P.R., BEng (RMC), MSc (Eng) (Queens), PhD (TUNS), PEng. Industrial safety and loss management, dust explosions.
Ben-Abdallah, N., BSc, MASc, PhD, PEng. Thermal energy storage, desiccant dehumidification, HVAC/indoor air quality, solar energy
Caley, W.F., BSc (Eng), MSc (Eng) (Queen's), PhD (Toronto), PEng. Ceramic and metal matrix composites, pyrometallurgy, slag/refractory reactions in steelmaking.
Fels, M., BEng, MEng (McGill), PhD (Waterloo), PEng. Air and water pollution control, solar energy.
Ghaly, A.E., BSc (Alexandria), MSc (Alexandria), PhD (McGill), PEng. Environmental Biotechnology, Industrial ecology, bioremediation, phytoremediation, fermentation technology, energy conversion.
Gill, T.A., BSc, MSc (Guelph), PhD (UBC). Food proteins and enzymes, seafood quality, safety, preservation, antimicrobial peptides and marine toxins.
Gupta, Y.P., BSc (BHU), MEng (TUNS), PhD (Calgary), PEng. Process control and optimization.
Kipouros, G.J., DiplEng (Athens), MASc, PhD (Toronto), PEng. Metal matrix composites, electrolysis in molten salt, rare earth magnetic materials, light, refractory and rare earth metals.
Paulson, A.T., BSc(Agr), MSc,PhD (UBC). Food chemistry, physico-chemical properties, polymers, emulsions and gels, dielectric methods, thermal processing, packaging & HACCP.
Pegg, M.J., BSc, PhD (Leeds), PEng. Combustion, safety and loss prevention
Speers, R.A., BSc(Agr), MSc, PhD (UBC). Brewing science, food fermentation, rheology, colloid science.
Watts, K.C., BSA, MSc, PhD, PEng. Biodiesel fuel, aquacultural engineering, agricultural machinery design, blood flow modeling.
Yemenidjian, N.B., BEng, PhD (Concordia), PEng. Electronic materials, hard materials, ceramics & glasses.

Associate Professors

Bishop, D.P., PhD (TUNS), MASc (TUNS), Program Chair. Aluminum powder metallurgy, metal matrix (composites), powder forging, structural automotive components. Composites, polymer toughening.
Ghanem, A., BSc (UNB), PhD (Cornell), PEng. Tissue engineering, drug delivery, bioprocessing, toxicology.
Gordon, R, BSc, MSc, PhD, PEng, PAg. Nova Scotia Agricultural College Bio-water management, constructed wetlands, climate change
Hart, W., BSc, PhD, Water Quality, environmental ecology, environmental assessment.
Kuzak, S., BEng, MEng (McGill), PhD (TUNS), PEng.
Plucknett, K.P, BSc, PhD (Warwick). Structural and functional ceramics, intermetallics, fibre-reinforced composites electron microscopy, material processing, mechanical properties, biopolymers.
Truelstrup-Hansen, L., Cand.Brom., PhD (Roy Vet Agr Univ Denmark). Food microbiology, seafood and food safety, antimicrobial peptides, probiotic bacteria, bacterial stress responses.
Wilkie. K.I., BEng, MEng, PhD, PEng. Bio-robotics, instrumentation.
Yuet, P., BEng (TUNS), MSc (Queen's), PhD (MIT), PEng. Colloids and surfactants, drilling fluids, shale inhibition.

Assistant Professors

Brooks, S., M.S., B.Tech (Massey), PhD (Cambridge), Peng Bioprocess Engineering, Biochemical Engineering, Biotechnology, Drug Delivery, Pharmaceutical Processing, Waste Utilization
Bowman, S., BSc (1985), PhD (1989)(Warwick, UK) Genomics, Metagenomics, Bioinformatics, DNA sequencing, Genotyping, Microarrays and Technology Development
Budge, S., BSc (Acadia), PhD (Memorial). Marine lipids, trophic studies, fish nutrition, lipid oxidation.
Farhat, Z., BASc, MASc, PhD (Windsor). Tribology, nanocrystalline and composite coatings, wear testing, curring tools, fuel cell materials.
Jamieson, R.C., BEng, MASc (TUNS), PhD, PEng (Guelph). Contaminant fate and transport, watershed assessment, water quality modelling, ecological engineering
Jarjoura, G., BEng (TUNS), MASc, PhD (Dalhousie). Material degradation, impedance spectroscopy, hydrogen absorbing materials.
Mazzanti, G., BEng (America), MASc, PhD (Guelph). Food processing, crystallization of lipids and protein, dehydration processes, food engineering

Adjunct Professors

Adsett, J.F., BSc, MScEng, PhD, Nova Scotia Agricultural College. Continuous nitrate monitoring, aquifer heat storage.
Al Taweel, A.M., BSc (Alexandria), MSc, PhD (Colorado), PEng. Mixing and separation, multi-phase CFD pollution prevention.
Armstrong, S., BSc, MSc, PhD. Biological and environmental studies, corrosion.
Chan, J. K-H., BSc (Hong Kong), MSc (Reading), PhD (TUNS). Nutraceuticals, functional foods.
Chaturvedi, M.C., BSc (Banaras), MMet, PhD (Sheffield). Aerospace materials, joining of materials, intermetallic materials.
Dabros, T., MSc, PhD (Jagiellonian)
Edwards, L.M., BSc, MSc, PhD, PAg, Agriculture Canada Research Station, Charlottetown. Soil erosion under conditions of freezing and thawing.
Gomaa, H., BSc, MSc (Alexandria), PhD (UNB)
Hamza, H.A., BSc (Cairo), PhD (Newcastle-upon-Tyne)
Hellenbrand, K.,PhD. Plant fungus relationships (micorrhizae), microbial air pollution., biofilms in terrestrial and ocean environments
Hollingshead, R.S., BEng, MEng, PhD (TUNS). Corrosion, failure analysis.
Jin, Y., B.Sc. (Yangzhou), MSc, PhD (Dal). Brewing science, colloid science, microencapsulation.

Kalmokoff, M., BSc (Guelph), MSc (Saskatchewan), PhD (Queen's). Food microbiology, biofilms, bacteriocins, listeria, intestinal microbiology.
Madani, S.D., BSc, MSc, PhD, Nova Scotia Agricultural College. Water quality, watertable management, subsurface drainage systems, irrigation scheduling.
Merritt, J.H., BEng (TUNS), MSc (Birm), PEng, CEng. Process engineering, refrigeration.
Mintz, K.J., BSc, MSc (UBC), PhD (Toronto)
Patterson, R.N., BSc (RMC), BASc (U of T), MASc (TUNS), PhD (Dal). Recirculating aquaculture systems, food engineering.
Pink, D.A.H., BSc (Hons StFX), PhD (UBC). Physics.
Quilliam, MA, BSc, PhD (Manitoba). Seafood toxins.
Rousseau, D., BSc, PhD. (Guelph). Emulsions, structure and function of food biopolymers.
Sami, S., BScEng, MScA, PhD. Alternative refrigerants, heat pumps, absorption.
Schraft, H., PhD (Zurich). Microbial biofilms.
Stewart, R.J., BSc, MSc, PhD (Toronto). Brewing microbiology, fermentation, biotechnology.
Stratton, G., BSc, MSc, PhD, Nova Scotia Agricultural College. Bioremediation, environmental microbiology, waste management.
Thibault, P., BEng (Hon), PhD (McGill)
Woo, S.S., BEng (Nat'l Taiwan Univ), MSc (Waterloo), PhD (McMaster)

Adjunct Assistant Professor

Peters, W.D., BScE, PhD, PEng. Aquacultural Engineering

Adjunct Associate Professor

Gharghouri, M.A., BASc, (Toronto), PhD (McMaster), PEng. Deformation of HCP metals, fatigue failure, electron microscopy, finite element analysis, crystal growth, activator materials.

Biological Engineering Program

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I. Introduction

Biological Engineering applies natural science and engineering principles to the biological world. As such, Biological Engineering addresses a wide range of problems relating to the environment, food and other biomaterial production and processing, renewable energy and reusable resources. Emphasis is placed on optimizing design performance in dealing with biological materials and systems while preserving sustainability and protection of the environment.

The Biological Engineering program has focused research in Environmental Engineering and Biosystems Engineering. Research projects therefore encompass both specific environmental concerns and the sustainable utilization of natural resources.

The Department has co-operative projects with faculty members in other Universities both locally and internationally. Opportunities exist to participate in these research projects, which provide wider experience and, in which a specific component leads to a Master's or Doctorate degree. See section on Engineering for details of Master's and Doctoral programs.

II. Class Descriptions

BIOE 6000.03: Small Watershed Hydrology.

Following an overview of the nature of hydrologic data and models, emphasis is placed on deterministic mathematical modelling of component processes and the synthesis of complete hydrographs. Components examined include precipitation, infiltration, evapotranspiration, surface and subsurface flow. The structure and application of selected current models are presented.
PREREQUISITE: A first class in engineering hydrology and microcomputer experience

BIOE 6010.03: Non-Point Source Pollution Control.

Course content initially deals with variants of the empirical USLE approach to soil erosion estimation and control on land surfaces through application of the RUSLE model. Theoretical and quasi-process concepts quantifying soil detachment, transport and deposition in interrill and rill runoff under rainfall and snowmelt leads to consideration of the dependent modelling of the form and movement of land applied nutrients and pesticides. Models used include COSSEM, ANSWERSPS, CREAMS and SWAT. Emphasis is placed on model application to assess measures to protect surface water, groundwater and aquatic life resources.
PREREQUISITE: At least one credit in engineering hydrology and microcomputer experience.

BIOE 6200.03: Advances in Waste Handling and Disposal.

Current methods of handling and disposal of wastes are discussed. Physical, chemical and biological properties of various types of waste materials as related to practical design problems are studied. Technological advances in holding tanks, lagoon design, pumping and agitation equipment, solid-liquid separation systems and land disposal equipment are introduced.

BIOE 6210.03: Advanced Biochemical Engineering.

This class deals with advances in microbial fermentation and enzymatic reactions in biological reactors. Topics covered include: microbial and enzyme kinetics, system parameters, reactor design and scale-up, media and air sterilization, measurements and control, and recovery of fermentation products.

BIOE 6230.03: Biological Treatments of Wastes.

The physical, chemical and biological properties of various wastes as related to the design of biological treatment processes are discussed. Fundamental microbiology and factors affecting the growth and survival of microorganisms in biological systems are studied. Engineering fundamentals of various biological processes are presented. Treatment systems such as aerobic and anaerobic lagoons, oxidation ponds, oxidizing ditches and composting are introduced.

BIOE 6240.03: Biomass Energy.

The source and amount of energy consumed in various agricultural operations will be studied. Renewable energy sources will be identified and their technical feasibility will be investigated. Technological advances in biochemical and thermochemical conversion systems will be included and the impact of these conversion systems on the environment will be studied.

BIOE 6300.03: Instrumentation for Agricultural Engineering Research.

The objective of this class is to integrate basic instrumentation and control components with a microcomputer. Primary elements which sense parameters of interest to Agricultural Engineers (e.g. humidity, temperature, pressure, flow, displacement, velocity and acceleration) are discussed with emphasis on the interfacing to a microcomputer. Topics covered in lectures and weekly laboratories include signal conditioning, digital to analog conversion, analog to digital conversion, voltage to frequency conversion, on-off control, and PID control. Students study the fundamentals through the breadboarding of a basic data acquisition and control system and by applying it to practical problems.

BIOE 6350.03: Advanced Instrumentation.

This class covers topics in microprocessor based measurement, computation, communications and control. Subject matter is covered in relation to the use of embedded microcontrollers. Development systems for both hardware and software emulation are utilized in weekly laboratory exercises and a term project. Topics covered include: assembly language programming, C programming using a "small C" environment, high speed data acquisition and data storage, computer to computer communications and interfacing of various sensor types and control hardware.

BIOE 6410.03: Advanced Food Engineering I.

The theoretical and practical aspects of food rheology and separation processes will be studied. These include: rheological characteristics of fluid and powdered foods, psychorheology, food extrusion, drying, freeze concentration, evaporation, membrane separation, and extraction. Emphasis will be place on recent research in these areas. The principles of process design will be incorporated in the design of various food processing plants.

BIOE 6420.03: Advanced Food Engineering II.

This class will deal with the concept of reaction kinetics in foods, thermal processing, and production/processing of food products. The concept of reaction kinetics will be applied to problems of storage stability and thermal processing calculations. Detailed coverage will be given to topics such as aseptic packaging, microwave sterilization, food irradiation, fouling of heat transfer equipment by fluid foods. Emphasis will be given on recent research in these areas.

BIOE 6510.03: Analytical Modelling in Farm Machinery.

This class investigates existing models that relate to some aspects of the operation or use of machinery on the farm. These models describe: material flow into, through, and out of farm machinery; forces on implements as they interact with the soil, etc.; heat and mass flow in grain dryers; optimum planning models, etc.

BIOE 6610.03: Applied Solar Energy.

The class covers the following topics: solar radiation measurement and methods of estimating the availability of solar energy for flat-plate solar collectors; flat-plate solar collectors design and methods of testing their performance; energy storage; procedures for solar heating systems design including computer simulations; and design of monitoring systems for the evaluation of the performance of solar heating systems and their components. Topics in any given year will depend on the interests of students.

BIOE 6700.03: Directed Studies I.

This class is available to graduate students enrolled in a MASc or MEng degree program in Biological Engineering wishing to gain knowledge in a specific area or areas related to, but distinct from their research topic, and in which no graduate level class is offered. The student will be involved in tutorials, laboratory and individual studies. The study will be presented in a report which uses thesis style format. Only one directed studies class can be used for credit for each degree.

BIOE 6710.03: Graduate Seminar I.

All students enrolled in a MASc or MEng degree program in Biological Engineering are required to participate in this course. The course is designed to provide students with the opportunity and experience of interaction with their peers, faculty and the profession. A written report and 30-minute oral presentation on the student's research or design topic (as appropriate) is required each year. Overall participation in all presentations during registration will be considered in assigning a grade.

BIOE 7610.03: Graduate Seminar II.

All students enrolled in a PhD degree program in Biological Engineering are required to participate in this course. The course is designed to provide students with the opportunity and experience of interaction with their peers, faculty and the profession. A written report and 30-minute oral presentation on the student's research is required each year. Overall participation in all presentations during registration will be considered in assigning a grade.

BIOE 7700.03: Directed Studies II.

This class is available to graduate students enrolled in a PhD program in Biological Engineering wishing to gain knowledge in a specific area or areas related to, but distinct from their research topic, and in which no graduate level class is offered. The student will be involved in tutorials, laboratory and individual studies. The study will be presented in a report which uses thesis style format. Only one directed studies class can be used for credit for each degree.

BIOE 9000.00: MASc Thesis.

BIOE 9530.00: PhD Thesis.

PEAS 6710:00: Graduate Research Symposium I.

All students enrolled in the MASc, MEng and MS degree programs are required to participate in this course. This course is designed to provide students with the opportunity and experience of interacting with their peers, faculty and profession. There will be an annual research symposium which will include guest speakers and/or panel discussions on topical issues presented by scholars from industry, government and academia and oral and poster presentations by students. One 30 minute oral presentation and one poster presentation must be given by the students at the department symposia during the student tenure. Students will be evaluated on quality of handouts, organization and preparation of material, presentation skills, technical content, knowledge of the subject, critical judgement of reference material and ability to answer questions. Graded Pass/Fail.

NOTE: This course will eventually replace Graduate Seminar I in all programs.

PEAS 7710:00: Graduate Research Symposium II.

All students enrolled in the PhD degree program are required to participate in this course. The course is designed to provide students with the opportunity and experience of interacting with their peers, faculty and profession. There will be an annual research symposium which will include guest speakers and/or panel discussion on topical issues presented by scholars from industry, government and academia and oral and poster presentations by students. Two 30 minute oral presentations and two poster presentations must be given by the student at the department symposia during the student tenure. Students will be evaluated on quality of handouts, organization and preparation of materials, presentation skills, technical content, knowledge of the subject, critical judgement of reference material and ability to answer questions. Graded Pass/Fail.

NOTE: This course will eventually replace Graduate Seminar II in all programs.

Chemical Engineering Program

Telephone: (902) 494-6225
Fax: (902) 420-0219
Email: Joann.Scott@dal.ca
Website: http://engineering.dal.ca/DEPARTMENTS/PEAS-Graduate_Progra.php

I. Introduction

The Chemical Engineering program prepares students for careers in the chemical and process industries and in a variety of related fields. These encompass, among others, the traditional areas of environmental control, plastics and polymers, pulp and paper, instrumentation and process control, petrochemicals, petroleum and natural gas processing, and energy conversion and utilization, as well as the growing fields of biotechnology, food processing, composite materials, corrosion and protective coatings, and manufacture of microelectronic components.

The responsibilities assumed by Chemical Engineers include a wide range of activities such as research and development of novel products and processes, the design, development and operation of process plants, and management of technical operations and sales.

Research opportunities leading to the Master's and Doctorate degrees are offered in a wide range of topics within the Department as well as in conjunction with other departments and a number of research centres on the campus. Detailed information regarding the graduate program can be obtained from the Department.

II. Class Descriptions

CHEE 6000.03: Special Topics in Chemical Engineering I.

This class is available to graduate students (pursuing a MASc degree) wishing to gain knowledge in a specific area for which no graduate level classes are offered. The proposed class would involve a directed study for which the student(s) would be given credit. Students wishing to take the class would be assigned a suitable class advisor most familiar with the specific area of interest. Students would be required to present the work of one term (not less than 90 hours in the form of directed research, tutorials and individual study), in an organized publication format.
PREREQUISITE: Instructor's permission

CHEE 6701.03: Loss Prevention and Risk Assessment.

Loss prevention and risk assessment techniques applicable to the process industries are covered in this class. The concepts of management control of loss and inherently safer plant design are introduced. Key elements of a successful fire and explosion loss control program are identified. Risk assessment is addressed by examining the steps required to proceed from the setting of risk assessment objectives to risk monitoring. The hazard identification step is emphasized.
PREREQUISITE: Graduate students in Faculty of Engineering
EXCLUSION: CHEE 4773.03

CHEE 6707.03: Applied Thermodynamics.

An analytical study of Chemical Engineering processes from the standpoint of quantitative chemical thermodynamics will be made. The approach to the main problem of reactions and phase equilibria and the treatment of non-ideal solutions is based on Gibb's methods and the chemical potential. Most of the student's time spent on this class will be used solving both theoretical and numerical problems.

CHEE 6714.03: Polymer Science.

This class examines the fundamental concepts of polymer science: mechanism and kinetics of polymerization reactions, rheological and mechanical properties of polymers, correlation of physical properties with molecular structure, molecular weight distribution, solution properties of polymers, polymer chain configuration, thermodynamics of polymer solutions, amorphous and crystalline state and viscoelasticity.

CHEE 6726.03: Mass Transfer Topics.

Topics are to be selected from the following fields: diffusion in both reacting and non-reacting systems, the equation of change, mass transfer with laminar or turbulent flow, unsteady-state diffusion, and mass transfer in packed beds.

CHEE 6730.03: Kinetics and Catalyses.

A general study of the current ideas of homogeneous and heterogeneous catalyses of chemical reactions will be made. In the field of homogeneous catalyses reactions: acid base catalyses, ion catalyses, enzyme catalyses, chain reactions and polymerization will be considered. In the field of heterogeneous catalyses, a study of the rates and extent of chemisorption will be made leading to an examination of the rate determining steps for gaseous reactions. Studies of some important industrial reactions will be made.

CHEE 6732.03: Transport Phenomena.

Mechanisms of transport processes, differential balances, equations of change for isothermal and non-isothermal systems, use of the equations of change to set up flow problems of interest to Chemical Engineers, interphase transport in isothermal systems, analogies.

CHEE 6734.03: Chemical Reactor Design.

The effect of non-ideal flow on the design of tubular, packed bed and continuous-stirred tank reactors, combined mass and energy transfer in chemical reactor analysis and design. Design of heterogeneous catalytic and non-catalytic reactors will be investigated using industrial case studies.

CHEE 6736.03: Computer Application in Chemical Engineering.

Mathematical modeling of steady and unsteady chemical process operations and the use of digital computers for the design and simulation of individual processing units. Synthesis of units into a combined processing plant. (It is recommended that students take ENGM 6653.03 – Numerical Analysis I prior to this class).

CHEE 6737.03: Chemical Process Control.

Dynamics modeling of chemical processes. Analysis and simulation of analog and digital control systems.

CHEE 6739.00: Graduate Research Seminar I.

Graduate students are required to participate in this class each term and make presentations based on their research projects. Guest lecturers will present special seminars on topics of current interest to the Chemical Engineering Profession. An oral presentation is required each year. Attendance at all seminars is mandatory for all students registered in the MASc program. Students will be evaluated on preparation skills, technical content, ability to answer questions and attendance. Graded pass/fail

CHEE 6742.03: Chemical Process Optimization.

The class deals with the study and application of optimization techniques to chemical engineering problems. Topics include: problem formulation, analytical and numerical techniques for optimization, linear programming, non-linear programming and dynamic programming. Application areas include: heat transfer and energy conservation, separation processes, fluid flow systems, chemical reactors, and process plants.
FORMAT: Lecture 2 hours, lab 3 hours

CHEE 6743.03: Process Synthesis.

This class aims at developing abilities in the design and modification process plants (e.g. chemical, biochemical, utilities, pulp and paper, petroleum, petrochemical, metals, and food processing) in order to render them more cost effective, energy-efficient and environmentally friendly. Systematic procedures are used for the analysis of processing stages and their integration into efficient plants. Heavy emphasis is placed on the use of computer-aided techniques for evaluating the interaction between processing requirements, utility needs and associated capital and operating costs.
FORMAT: Lecture 2 hours, lab 3 hours

CHEE 6744.03: Radiative Heat Transfer.

The principles of thermal radiation are explained and the concepts of view factors and exchange areas are introduced by examining direct radiative transfer. Radiative exchange within enclosures, containing either non-absorbing or absorbing media are examined. Various radiative heat transfer applications are discussed in detail. These include: electric furnaces, fuel-fired furnaces and solar radiation. The methods of measurements of radiation and temperature are studied.
FORMAT: Lecture 2 hours, lab 3 hours
PREREQUISITE: Background in heat transfer and mathematics

CHEE 6750.03: Combustion Phenomena.

Mathematical formulations of combustion phenomena and their physical significance will be emphasized. Application of the conservation equations for multicomponent reacting flows by means of the Schwab-Zeldovich formulation will be demonstrated. The general Rankine-Hugoniot relations will be developed to calculate properties across a shock front. Laminar and diffusion flames will be studied. Chemical reactions in boundary layers will be examined and turbulent combustion phenomena will be analyzed.
FORMAT: Lecture 1 hour, lab 3 hours

CHEE 6755.03: Colloids and Interfaces in Petroleum Engineering.

This class examines the fundamental principles in colloidal and interfacial systems, with particular emphasis on their applications in petroleum engineering. The first part of the class covers the theories of colloidal

stability, interfaces, and surfactant solutions. These principles are then applied to analyse drilling-fluid design and enhanced oil recovery.
FORMAT: Lecture, tutorial
PREREQUISITE: CHEE 3530 or permission of instructor

CHEE 6800.03: Chemical Engineering in Biological Systems.

This class deals with the application of chemical engineering principles (stoichiometry, kinetics, transport phenomena) to analyze biological systems such as cells, organs and organ systems. Applications include implants and medical devices, drug delivery systems, cell culture processes, diagnostics, immobilized enzymes and pharmacokinetics.
FORMAT: Lecture
PREREQUISITE: CHEE 3634, CHEE 4726 or permission of instructor

CHEE 7000.03: Special Topics in Chemical Engineering II.

This class is available to Graduate Students (pursuing a PhD degree) wishing to gain knowledge in a specific area for which no graduate level class is offered. Students will be assigned a class supervisor most familiar with the specific area of interest. Students will be required to present the work of one term consisting of at least 90 hours in the form of directed research, tutorials and individual study, in an organized publication format.
PREREQUISITE: Instructor's permission

CHEE 7739.00: Graduate Research Seminar II.

Chemical Engineering Profession. An oral presentation is required each year. Attendance at all seminars is mandatory for all students registered in the PhD program. Students will be evaluated on preparation skills, technical content, ability to answer questions and attendance. Graded pass/fail

CHEE 9000.00: Master's Thesis.

CHEE 9530.00: PhD Thesis.

PEAS 6710:00: Graduate Research Symposium I.

All students enrolled in the MASc, MEng and MS degree programs are required to participate in this course. This course is designed to provide students with the opportunity and experience of interacting with their peers, faculty and profession. There will be an annual research symposium which will include guest speakers and/or panel discussions on topical issues presented by scholars from industry, government and academia and oral and poster presentations by students. One 30 minute oral presentation and one poster presentation must be given by the students at the department symposia during the student tenure. Students will be evaluated on quality of handouts, organization and preparation of material, presentation skills, technical content, knowledge of the subject, critical judgement of reference material and ability to answer questions. Graded Pass/Fail.
NOTE: This course will eventually replace Graduate Seminar I in all programs.

PEAS 7710:00: Graduate Research Symposium II.

All students enrolled in the PhD degree program are required to participate in this course. The course is designed to provide students with the opportunity and experience of interacting with their peers, faculty and profession. There will be an annual research symposium which will include guest speakers and/or panel discussion on topical issues presented by scholars from industry, government and academia and oral and poster presentations by students. Two 30 minute oral presentations and two poster presentations must be given by the student at the department symposia during the student tenure. Students will be evaluated on quality of handouts, organization and preparation of materials, presentation skills, technical content, knowledge of the subject, critical judgement of reference material and ability to answer questions. Graded Pass/Fail.
NOTE: This course will eventually replace Graduate Seminar II in all programs.

Food Science Program

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Website: http://engineering.dal.ca/DEPARTMENTS/PEAS-Graduate_Progra.php

I. Introduction

Food Science programs in North America largely evolved from the dairy science programs that were common, particularly in agricultural colleges, during the early to mid portion of the 20th century. Food Science emerged as a discipline including not only dairy science, but also meat, cereal, and seafood science, the study of fruit and vegetable products, and the like. Today, Food Science is rarely viewed as commodity-based and researchers in the field are multi-disciplinary in their background and approach to problem solving. Food Science students at the undergraduate level usually have had training in basic sciences such as physics, mathematics, physical chemistry, organic chemistry, and biochemistry, biology, microbiology, etc. Food Science research at the graduate level then, is the application of principles derived from these basic sciences to complex food systems. Food researchers are concerned about the functionality of food ingredients, the preservation of quality and delivery of nutrients through the food supply. They are interested in innovative new technologies used to process and protect foods from degradation. A great deal of activity is currently under way in university, government and industrial food research facilities to ensure the safety of the food supply and particular attention is being paid to new and emerging food borne pathogens such as *E. coli* 0157:H7.

Food scientists and engineers may become involved in food research, quality assurance, process, or product development within the food industry. Alternatively, they may be employed by governmental agencies such as Agriculture and Agri-Food Canada, Health Canada, Canadian Food Inspection Agency, Fisheries and Oceans or provincial agencies which serve the public and industries related to food. These are only a few examples of the many opportunities available for food science graduates.

The graduate degree programs share some facilities with the Canadian Institute of Fisheries Technology, a specialized resource center for graduate education and research in food science and food process engineering with emphasis on seafoods. Graduate degrees are awarded in Food Science and Technology at the Master and Doctoral levels. The Program offers graduate level class work and research opportunities related to food process technology, food microbiology, edible oils, engineering design, post-mortem biochemistry of muscle foods, proteins and enzymes, food rheology, and beverage science. A wide range of food processing equipment, a pilot plant, and well-equipped laboratories offer unique opportunities for graduate training and research. Students with degrees in food science, engineering, chemistry/biochemistry, microbiology or biology are invited to apply. Details of the academic programs are given in the section "Graduate Programs in Engineering." Research programs and equipment are described under "Canadian Institute of Fisheries Technology" on page 295 of this calendar.

II. Class Descriptions

FOSC 6324.03: Fish/Food Processing I.

This class consists of lectures, labs and pilot plant experiments emphasizing the chemistry of seafoods particularly in processing and handling. Postmortem biochemistry and spoilage due to species differences is covered in detail as well as low temperature preservation. Effects of processing on fat, protein and edibility are examined. Other topics include the effect of enzymes on food quality, seafood toxins, heavy metals, chemistry of seafood colors, and seafood safety.

FOSC 6325.03: Fish/Food Processing II.

Physical aspects of food preservation are studied. Process operations include refrigeration, freezing, thermal pasteurization and sterilization, dehydration, radiation processes and packaging.

FOSC 6328.03: Advanced Food Chemistry.

This class is designed to cover advanced topics in food chemistry with emphasis on their relationships to fundamental principles. The class consists of lectures and laboratory projects, and incorporates the following topics: water relations, carbohydrates, amino acids, peptides, proteins, lipids, additives, colloids, phytosystems and post-harvest physiology.

FOSC 6329.03: Chemistry of Fats, Oils and Lipids.

The difference in physical and chemical properties of natural fatty acids are correlated with the physical nature of fats, oils and lipids, and the chemical combinations of fatty acids with glycerol, amino acids, fatty alcohols, sterols and other chemical materials. Methods of separation such as chromatography, solubility and crystallization are explained in terms of the molecular properties. Important industrial processes and products are included.

FOSC 6330.03: Fish/Food Process Engineering.

Emphasis is placed on sound principles in the design and operation of equipment commonly used in factories for the manufacture of food products and by-products. The main elements are thermal principles, psychometry, steam utilization, refrigeration, fans and ducts, and pumps and piping. Measures to reduce waste and pollution and especially the abatement of odour nuisance from the food processing factory are reviewed.

FOSC 6331.03: Food Proteins and Enzymes.

This class is designed to provide a comprehensive overview of the significance and function of proteins as structural and biochemical entities within food systems. The first component of this class centers on the identification and biochemical significance of protein systems in food, the physico-chemical and degradative interaction of proteins with other food components and their overall impact on nutritive properties. The second component focuses on the fundamental properties of enzymes in food systems. In addition, mechanisms and roles of enzymes in food processing operations, and the utilization of enzymes in the food industry, are presented.

FOSC 6333.03: Industrial Rheology.

This class deals with rheological principles of fluid materials employed in the food, mineral and chemical process industries. Rheometric techniques including co-axial, cone and plate, capillary and in-line rheometers are examined. The behavior of flocculent and non-flocculent suspensions is discussed in light of present rheological theories. The viscoelastic properties of selected colloidal, polymer and biological systems will also be examined.

FOSC 6334.03: Food Microbiology.

This class is intended for students with an interest in aspects of the microbiological quality and safety of the food supply. Topics include the occurrence and significance of food borne pathogens and spoilage organisms, the control of microorganisms in foods and the industrial use of microorganisms for the manufacture of foods, beverages and food ingredients. Material will be covered from both a theoretical and practical perspective.

FOSC 6336.03: Advanced Food Hygiene and Public Health.

This class deals with aspects of food hygiene, sanitation technology, water and environmental microbiology, water treatment microbiology and epidemiology of food and waterborne pathogens. The laws and regulations governing food production in Canada at provincial and federal levels will be discussed. Current issues in public health in relation to the safety of our water and food supply will be covered. Lecture and laboratory periods will explore these topics from a theoretical and practical perspective.

FOSC 6350.03: Graduate Seminar I.

This seminar class is designed to provide students pursuing an MSc degree with the opportunity to search the literature for information on current topics in food science, fisheries or food engineering and to offer their findings orally in one-hour presentations to faculty and students. Students also submit a written version of the seminar. All MSc students are expected to take the seminar class every academic term for the duration of their program.

FOSC 6351.03: Directed Studies I.

This class allows students pursuing an MSc degree to gain knowledge in a specific area in which no graduate level class is offered. The class involves a directed research or design project for which the student will be given credit. Students are assigned a suitable area of interest and are required to present the work of one term (not less than 90 hours in the form of directed research, tutorials and individual study), in a written report.

FOSC 6381.03: Advanced Brewing Science.

This course will examine the unit operations employed during the production of malt and beer. Brewing, fermentation and packaging aspects of beer production as well as brewing quality assurance, colloidal stability and haze development will be discussed.
INSTRUCTOR(S): Speers, R.A.
FORMAT: Lecture, tutorial and lab
CROSS-LISTING: FOSC 4081.03

FOSC 7350.03: Graduate Seminar II.

This seminar class is designed to provide students pursuing a PhD degree with the opportunity to search the literature for information on current topics in food science, fisheries or food engineering and to offer their findings orally in one-hour presentations to faculty and students. Students will also submit a written version of the seminar. All PhD students are expected to take the seminar class every academic term for the duration of their program.

FOSC 7351.03: Directed Studies II.

This class allows students pursuing a PhD degree to gain knowledge in a specific area in which no graduate level class is offered. The class involves a directed research or design project for which the student will be given credit. Students are assigned a suitable area of interest and are required to present the work of one term (not less than 90 hours in the form of directed research, tutorials and individual study) in a written report.

FOSC 9000.00: Master's Thesis.

FOSC 9530.00: PhD Thesis.

PEAS 6710:00: Graduate Research Symposium I.

All students enrolled in the MASc, MEng and MS degree programs are required to participate in this course. This course is designed to provide students with the opportunity and experience of interacting with their peers, faculty and profession. There will be an annual research symposium which will include guest speakers and/or panel discussions on topical issues presented by scholars from industry, government and academia and oral and poster presentations by students. One 30 minute oral presentation and one poster presentation must be given by the students at the department symposia during the student tenure. Students will be evaluated on quality of handouts, organization and preparation of material, presentation skills, technical content, knowledge of the subject, critical judgement of reference material and ability to answer questions. Graded Pass/Fail.
NOTE: This course will eventually replace Graduate Seminar I in all programs.

PEAS 7710:00: Graduate Research Symposium II.

All students enrolled in the PhD degree program are required to participate in this course. The course is designed to provide students with the opportunity and experience of interacting with their peers, faculty and profession. There will be an annual research symposium which will include guest speakers and/or panel discussion on topical issues presented by scholars from industry, government and academia and oral and poster presentations by students. Two 30 minute oral presentations and two poster presentations must be given by the student at the department symposia during the student tenure. Students will be evaluated on quality of handouts, organization and preparation of materials, presentation skills, technical content, knowledge of the subject, critical judgement of reference material and ability to answer questions. Graded Pass/Fail.
NOTE: This course will eventually replace Graduate Seminar II in all programs.

Materials Engineering Program

Telephone: (902) 494-6225
Fax: (902) 420-0219
Email: Joann.Scott@dal.ca
Website: http://engineering.dal.ca/DEPARTMENTS/PEAS-Graduate_Progra.php

I. Introduction

Students that complete graduate-level degrees in Materials Engineering readily find challenging, rewarding, and lucrative employment in industry, academe and government organizations. This is undermined by the strong research record of the Materials Engineering faculty wherein a mix of fundamental research coupled with work of direct commercial relevance is conducted in collaboration with industry. The Program offers opportunities for study in fields ranging from materials production (extraction from ores) to the design, development, and processing of advanced materials from these basic building blocks. Topics of current research include powder metallurgy processing of light metals, intermetallics, and cermet materials, corrosion, electronic materials development, synthesis of intermetallic compounds, ceramic processes and properties, as well as composite materials synthesis. These research projects are funded by national and international granting agencies, industry, and government organizations.

The program presents an outstanding environment for students to conduct graduate level studies given the inherent diversity of scientific expertise, specialized infrastructure, modern materials characterization tools, and established links with large multi-national industrial partners that exist. To this end, the program ultimately enables researchers to develop new materials or processing technologies in a forum known to closely replicate industrial practice, characterize the material attributes of the synthesized products in great detail, and then apply the knowledge learned in actual manufacturing scenarios.

The program houses modern, well-equipped laboratories for materials extraction, synthesis and characterization. Facilities include state-of-the-art equipment such as an analytical cold field emission scanning electron microscope, a focused ion beam milling system, a 50-ton high temperature controlled-atmosphere hot press, powder-presses, controlled-atmosphere muffle, tube, and induction furnaces, as well as an array of thermal analysis tools, piezoelectric characterization facilities and systems for directional solidification and single crystal preparation. In total, over $4M worth of new infrastructure has been commissioned within the program in the last four years alone. Students also have access to excellent computer facilities and many benefit from the services offered by the Minerals Engineering Centre, which is affiliated with the Materials Engineering Program. The Centre provides research, analytical and advisory services to industries, universities and government bodies.

Graduate programs are available leading to the degrees of Master of Engineering (MEng), requiring advanced course work, Master of Applied Science (MASc) requiring advanced course work and a research thesis, and Doctor of Philosophy (PhD), requiring a major research thesis and advanced course work. A Combined Bachelor of Engineering/Master of Applied Science (BEng/MASc) degree is also offered. The decision to select the Combined BEng/MASc, option may be made at the end of the common first two academic terms in Materials Engineering.

II. Class Descriptions

MATL 6010.03: Introduction to Transmission Electron Microscopy.

This class will deal with transmission electron microscopy including the basic principles and methods of operation of the electron microscope, the elements of electron optics, and the kinematical theory of electron diffraction and image formation. Replica methods, extraction and thin film techniques and applications of transmission electron microscopy to the study of metallic and non-metallic solids will be discussed. Laboratory work will provide students with a working knowledge of the transmission electron microscope.

MATL 6011.03: Introduction to the SEM and Microprobe.

This class will deal with scanning electron microscopy and with electron microprobe analysis. The electron optics of the scanning electron microscope and of the electron beam microprobe will be discussed. Electron/ specimen interactions will be studied including the excitation and absorption of X-rays. Correction techniques necessary for quantitative microanalysis and applications of the microprobe to the solution of materials problems will be discussed. Laboratory work will give students a working familiarity with the scanning electron microscope.
A laboratory fee is applicable to this class.

MATL 6014.03: Welding Metallurgy.

This class will cover the effect of mass and heat flow, for the various joining processes, on the metallurgical properties of the parent and weld metal. The processes will include brazing, soldering, solid phase welding and fusion welding for the major classifications of metals such as carbon and alloy steels and non-ferrous metals. This class will include laboratory periods designed to reinforce the lecture material.

MATL 6015.03: High Temperature Metallurgical Operations Part I.

The class will consist of a review of metallurgical thermodynamics, with reference to various metallurgical operations. It will also include reference to slag theory, as well as experimental techniques used in high temperature metallurgical research.

MATL 6016.03: High Temperature Metallurgical Operations Part II.

The class will consist of a survey of the factors which affect the kinetics of high temperature heterogeneous processes and their effect on the rate of various pyrometallurgical operations.

MATL 6017.03: Hydrometallurgical Operations.

New developments in the leaching, solution purification, and recovery of metals will be studied as they apply to the extraction of metals from various feed materials by hydrometallurgical processes.

MATL 6018.03: Structural Physical Metallurgy.

An advanced study of certain topics such as solidification, imperfections in crystals, recovery, recrystallization and grain growth, and solid state transformations. The class content will be adapted to the interest of the student as far as possible. Weekly seminars will be held.

MATL 6019.03: Selected Topics in Extractive Metallurgy.

This class is given by a visiting professor. The topic of the lectures is in the field of specialization of the lecturer.

MATL 6020.03: Selected Topics in Physical Metallurgy.

This class is given by a visiting professor. The topics of the lectures is in the field of specialization of the lecturer.

MATL 6021.03: Selected Topics in Mineral Processing.

This class is given by a visiting professor. The topic of the lectures is in the field of specialization of the lecturer.

MATL 6022.03: Directed Studies in Metallurgical Engineering.

This class is available to graduate students enrolled in a Masters program in Metallurgical Engineering wishing to gain knowledge in a specific area for which no graduate level class is offered. Students are assigned an advisor and are required to present a formal report at the end of the class. A maximum of one Directed Studies class may be taken for credit in a Masters degree program.

MATL 6030.03: Fracture of Metallic Materials.

This class will cover the failure of metals under ductile and brittle fracture, creep rupture and fatigue conditions. Fracture mechanics concepts will be used to quantify fracture parameters in the presence of pre-existing flaws or propagating cracks. The interaction between the various failure mechanisms, including high temperature oxidation and sulphidation, will also be discussed.
PREREQUISITE: MATL 3500.03 or MATL 3620.03 or equivalent

MATL 6040.03: Advanced Process Metallurgy.

Chemical and electrochemical processes for the extraction and refining of materials are examined in terms of chemical thermodynamics and kinetics. Selected topics will be discussed related to the behaviour of metallic, ceramic, glass and metal slag systems at high temperatures. The thermodynamic and transport properties will be discussed for a number of systems such as alloys, oxides, carbides and silicides.

MATL 6805.03: Electrochemical Processing of Materials.

The class discusses principles of electrochemistry and electrochemical engineering as they apply to the design of processes for the production of materials. The theory and application of various electrochemical techniques such as electroplating, electroforming, electromachining, electrorefining, and fused-salt electrolysis are included. A brief overview on the development of electrochemical sensors and devices using solid state electrolytes is presented. Surface modification by electrochemical means is also discussed.
CROSS-LISTING: MATL 4805.03

MATL 6806.03: Particulates in Mat'l Eng.

The class covers the preparation, characterization, physical and chemical properties and processing of powders in materials processing including agglomeration, gas-solid reactions, sintering and hot pressing.
CROSS-LISTING: MATL 4806.03

MATL 6900.03: Metallurgical Graduate Seminar I.

All Master's students are required to participate in the seminar every year. Students will make presentations on topics related to their research projects. There will normally be one presentation per year. Evaluation will be based on presentation skills, ability to field questions and regular attendance. Graded pass/fail.
FORMAT: Lecture 1 hour

MATL 7022.03: Directed Studies in Metallurgical Engineering.

This class is available to graduate students enrolled in a PhD Program in Metallurgical Engineering wishing to gain knowledge in a specific area for which no graduate level class is offered. Students are assigned an advisor and are required to present a formal report at the end of the class.
A maximum of two Directed Studies classes may be taken for credit in a PhD Program.

MATL 7900.03: Metallurgical Graduate Seminar II.

All PhD students are required to participate in the seminar each year. Students will make presentations on topics related to their research projects. There will normally be one presentation per year. Evaluation will be based on presentation skills, ability to field questions and regular attendance. Graded pass/fail.
FORMAT: Lecture 1 hour

MATL 9000.00: Master's Thesis/Project.

MATL 9530.00: PhD Thesis.

PEAS 6710:00: Graduate Research Symposium I.

All students enrolled in the MASc, MEng and MS degree programs are required to participate in this course. This course is designed to provide students with the opportunity and experience of interacting with their peers, faculty and profession. There will be an annual research symposium which will include guest speakers and/or panel discussions on topical issues presented by scholars from industry, government and academia and oral and poster presentations by students. One 30 minute oral presentation and one poster presentation must be given by the students at the department symposia during the student tenure. Students will be evaluated on quality of handouts, organization and preparation of material, presentation skills, technical content, knowledge of the subject, critical judgement of reference material and ability to answer questions. Graded Pass/Fail.
NOTE: This course will eventually replace Graduate Seminar I in all programs.

PEAS 7710:00: Graduate Research Symposium II.

All students enrolled in the PhD degree program are required to participate in this course. The course is designed to provide students with the opportunity and experience of interacting with their peers, faculty and profession. There will be an annual research symposium which will include guest speakers and/or panel discussion on topical issues presented by scholars from industry, government and academia and oral and poster presentations by students. Two 30 minute oral presentations and two poster presentations must be given by the student at the department symposia during the student tenure. Students will be evaluated on quality of handouts, organization and preparation of materials, presentation skills, technical content, knowledge of the subject, critical judgement of reference material and ability to answer questions. Graded Pass/Fail.
NOTE: This course will eventually replace Graduate Seminar II in all programs.

Prosthodontics

Location: Room 5168
Dentistry Building
5981 University Avenue
Halifax, NS B3H 1W2
Telephone: (902) 494-7179
Fax: (902) 494-1662
Website: http://www.dentistry.dal.ca/Programs/gradpros

Prosthodontic Graduate Program Director and Coordinator

Price, R.B.

Professors

Gerrow, J.D., DDS (Toronto), MS, Cert Pros (Iowa), MEd (Dal), MRCD(C), FICD, FACD, Prosthodontics
Lee, S.F., BSc, PhD (Guelph), Oral Biology, Microbiology & Immunology
Loney, R. W., BSc, Cer. BSc Adv., DMD (Saskatchewan), MS (Michigan), Prosthodontics
Precious, D.S., DDS, MSc (Dal), FRCD(C), FADI, FICD, FACD, Oral and Maxillofacial Surgery
Price, R.B.T., BDS (Lon), DDS (Dal), FDS, RCS, (Edin), MSc (Michigan), FRDC(C), PhD (Malmö) Prosthodontics
Sutow, E.J., BSc (Penn St), PhD (U. of Penn). MEd (Dal), Biomaterials.

Associate Professors

Davis, B., BSc (St FX), DDS (Western), FRCD(C) Oral & Maxillofacial Surgery
Filiaggi, M.J., BSc Eng (Penn), MASc, PhD (Toronto). Biomaterials, Biomedical Engineering
Matthews, D., BSc, DDS (Alberta), Dip. In Perio (Toronto), MSc (McMaster). Prosthodontics.
Morrison, A.D., DDS, MSc, FRCD (C), Trauma and Orthognathic surgery
Murphy, H.J., BSc (St. Dunstan's), BEd (PEI) Med., EdD (Virginia). Patient & Community Care.
Russell, K.A., BSc, DDS (Dal), MSc (Toronto), Orthodontics

Assistant Professors

Bannerman, R.A., BSc, DDS (Dal), MScD (Ind), MEd (Dal), Prosthodontics
Doyle, M.G., BSc (St. FX), DDS (Dal), Cert. In Pros. (Indiana), Prosthodontics
Marquez, C., DDS (Mexico), MSc (Michigan), Periodontics
Richardson, S., BSc (PEI), MSc, DDS (Dal), Cert. Pros (State Univ NY), Cert. Maxill. Pros (Roswell Park Cancer Instit.), Prosthodontics
Roda, M.R., DDS (Dal), MSD (Dal), Cert in FPP (Indiana), Prosthodontics
Taylor, J.C., BSc, DMD (UBC), Cert. Prosth. (Walter Reed), FAO, FADI, Prosthodontics

I. Introduction

Two graduate programs are offered in Prosthodontics. Students can opt for either a Master of Science in Prosthodontics from the Faculty of Dentistry, or a Combined Diploma in Prosthodontics with a Master of Applied Science (MASc), Biomedical Engineering. These programs are offered as a collaborative effort of the Faculty of Dentistry and the School of Biomedical Engineering.

A minimum three year time commitment will normally be necessary to satisfy the requirements of either program.

The primary objective of both programs is to produce clinician-researchers who will be prepared for an academic career in the related fields of Prosthodontics and Biomedical Engineering. As clinicians, these graduates will provide an important link between clinical treatment and basic science research. The programs will be particularly attractive to students who are interested in an academic career in Prosthodontics. Students will have the opportunity to work in dedicated space in the Faculty of Dentistry clinics and dental laboratories, as well as the fully equipped biomaterials research and the new tissue engineering facilities. All students in the program will be given the opportunity to teach in the undergraduates D.D.S. program. Stipends are available. The program has been accredited by the Commission on Dental Accreditation of Canada.

II. Admission

Students will require a Doctor of Dental Surgery (DDS) or equivalent and must fulfil the following admission requirements:

1. A minimum mid-B average during the student's undergraduates coursework (with a minimum average of A- over the last two years) will be required, plus demonstrated ability to communicate and write in English (consistent with the entry requirements of the Faculty of Graduate Studies, e.g. TOEFL >600).
2. GRE Aptitude and advanced scores in one of the sciences are recommended for all applicants whose undergraduate work has been completed outside Canada.
3. Students in the combined Prosthodontics and Biomedical Engineering program will require undergraduate mathematics, physics, and chemistry. The exact requirements for these areas will depend on the nature of the research thesis to be undertaken, but normally will require second year calculus. The requirements will be developed in consultation with the School of Biomedical Engineering.
4. Applicants who have not taken the equivalent of D3617 Implant Dentistry will have to take D3617 in the first year of their program.

Selection

All applications are reviewed by the Prosthodontic Graduate Program Director, in consultation with faculty members. They will make recommendation to the Faculty of Graduate Studies for acceptance or rejection, including any required conditions of admission. Official acceptance is achieved when the recommendation has been approved by the Faculty of Graduate Studies and a formal letter of acceptance is issued by the Registrar's Office.

Scholarships

Financial aid is considered at the same time as admission, a separate application is not necessary. Virtually every full time student accepted into the graduate program will receive a stipend derived from research and teaching funds. Students are encouraged to teach in the undergraduate dental clinics. All students who teach will receive stipends from the Faculty of Dentistry. Minimum stipends for 2008-2009 were $17,300.

Stipends of $14,000 to $18,000 are available on a competitive basis from local and national granting agencies. Normally, students who are accepted are supported financially either by external sources or Dalhousie scholarships. Limited Dalhousie funds are rapidly committed, so applications should be made early, preferable by April 1 at the latest.

III. Degree Requirements

Master of Science Program

Students will take seven required courses in prosthodontics including a research based thesis course. Two of these courses are full year, evidenced-based seminar/literature review courses. One is a half year evidenced-based seminar/literature review course. The other three courses are clinical courses involving patient treatment. In addition, students will be required to take three graduate level courses (selected in consultation with their thesis advisor and their thesis committee members and approved by the Graduate Program Director and the Faculty of Dentistry Graduate Programs Curriculum Sub-committee) primarily from the graduate courses offered by the School of Biomedical Engineering. The other faculty/school involved must also approve the student's participation in the elective courses.

Master of Applied Science Program (Biomedical Engineering)

Completion of 5 full classes in Graduate Prosthodontics and a total of 6 half-credit classes (3 full-credits) in Biomedical Engineering to be chosen in consultation with a school advisor. It is expected that a minimum of four of these classes will be taken from the suite of 5000-level courses offered by the School of Biomedical Engineering. A research thesis representing original work by the student will be carried out under joint supervision of a faculty member of the School of Biomedical Engineering (who is also a member of the Faculty of Graduate Studies). The student must also undertake a satisfactory oral defense of the research thesis.

The individual student determines the area of study for their thesis. However, there is an opportunity to work as a member of a team in areas of ongoing research conducted at the Faculty of Dentistry and the School of Biomedical Engineering.

Each student will normally have a supervisory committee consisting of the Graduate Coordinator, the thesis supervisor, and other faculty members. The supervising committee will meet at least twice a year (including September following admission), or when called by any member of the committee or the student.

IV. Class Descriptions

PROS 5611.06: Seminar in Prosthodontics I.

A series of seminars in prosthetic rehabilitation of the partially and completely edentulous patients, using advance techniques and materials. Emphasis on behavioral, medical and ethical aspects of providing therapy for patients with challenging Prosthodontic needs. A focus on biocompatibility and biomedical engineering aspects of treatment.
INSTRUCTOR(S): Loney, R.W., Gerrow, J.D., Price, R.B.T., Doyle, M.G.,
FORMAT: Seminar

PROS 5616.06: Clinical Prosthodontics I.

Graduate students gain proficiency in diagnosis, treatment planning and providing treatment for partially and completely edentulous patients. Treatment includes fixed and removable partial dentures, the use of attachment prostheses, and implant and conventional complete dentures to treat patients with severe residual ridge resorption.
INSTRUCTOR(S): Loney, R.W., Gerrow, J.D., Price, R.B.T., Doyle, M.G., Bannerman, R.A.,
FORMAT: Clinical

PROS 6611.06: Seminar in Prosthodontics II.

An exploration of the prosthetic rehabilitation of the partially and completely edentulous patients, using fixed, removable, implant and maxillofacial prostheses. Applied anatomy, pharmacology, pathology, physiology, growth and development and biomaterial science will be integrated into seminars. A focus on evidence-based treatment.
INSTRUCTOR(S): Loney, R.W., Gerrow, J.D., Price, R.B.T., Doyle, M.G., Bannerman, R.A.,
FORMAT: Seminar

PROS 6616.06: Clinical Prosthodontics II.

Graduate students gain proficiency in diagnosis, treatment planning and providing advanced treatment for partially and completely endentulous patients as well as patients with maxillofacial deformities. Treatment includes full mouth reconstructions, complex implant cases and patients requiring multidisciplinary interventions.
INSTRUCTOR(S): Loney, R.W., Gerrow, J.D., Price, R.B.T., Doyle, M.G., Bannerman, R.A.,
FORMAT: Clinic
PREREQUISITE: PROS 5616.06

PROS 7616.06: Clinical Prosthodontics III.

Graduate students gain proficiency in diagnosis, treatment planning and providing advanced treatment for partially and completely endentulous patients with complex problems. Treatment includes full mouth reconstructions, complex cases and patients requiring multidisciplinary interventions.
INSTRUCTOR(S): Loney, R.W., Gerrow, J.D., Price, R.B.T., Doyle, M.G., Bannerman, R.A.,
FORMAT: Clinic
PREREQUISITE: PROS 6616.06

PROS 9000.06: Prosthodontic Research (Thesis).

The graduate student will complete an original research project and publish their findings in a thesis. The thesis and a formal defense must be completed acceptably as evaluated by student's thesis examination committee and must meet the requirements of the Faculty of Graduate Studies.
FORMAT: Thesis

Psychology

Location: Life Sciences Centre
1355 Oxford Street
Halifax, NS B3H 4J1
Telephone: (902) 494-3417
Fax: (902) 494-6585
Website: www.Psychology.dal.ca

Chairperson of Department

Brown, R.E.

Graduate Coordinator

Klein, R.M.

Professors Emeriti

LoLordo, V.M., AB (Brown), PhD (Penn). Learning, animal behaviour.

Mitchell, D.E., BSc, MASc (Melb), PhD (Berkeley). Visual system development, visual perception.

Professors

Brown, R.E., BSc (Victoria), MA, PhD (Dalhousie). Behavioural endocrinology, developmental psychobiology, drugs and behaviour, behaviour of transgenic and mutant mice.

Bryson, S.E., BA (Guelph), PhD (McGill), Major appointment in Pediatrics, Joan & Jack Craig Chair in Autism Research. Autism and related developmental disorders, developmental neuropsychology, development of attention, cognition and emotion.

Camfield, C., BS, MD (Michigan), FRCPC, Major appointment in Pediatrics. Pediatric epilepsy and mental handicap, psychosocial-quality of life issues in children with chronic health problems.

Finley, G.A., BSc, MD (Dalhousie), FRCPC, Major appointment in Anaesthesia. Pediatric pain (measurement and management), audible alarm signals, perioperative anxiety, awareness and memory.

Kay-Raining Bird, E., BA (Queen's), MSc (Columbia), PhD (Wisconsin-Madison), Major appointment in the School of Human Communication Disorders. Child language development and disorders, Down syndrome, autism, language assessment and intervention, literacy.

Klein, R.M., BA (SUNY), MA, PhD (Oregon), University Research Professor, Graduate Program Coordinator. Human attention and information processing, oculomotor control, cognitive neuroscience, language and literacy, applied cognitive psychology.

Lyons, R., BA (Dalhousie), MEd (StFX), PhD (Oregon), Major appointment in the School of Health and Human Performance; Canada Research Chair in Health Promotion; Director, Atlantic Health Promotion Research Centre. Health promotion, health psychology, personal relationships, coping, health services and policy (chronic illness).

McGrath, P., BA, MA (Sask), PhD (Queen's), Canada Research Chair in Pediatric Pain. Pediatric pain, distance treatment of mental health problems, and chronic illness.

McMullen, P., BSc, MSc (Toronto), PhD (Waterloo). Visual cognition, cognitive neuropsychology.

Meinertzhagen, I.A., BSc (Aberdeen), PhD, DSc (St. Andrews), University Research Professor. Structure and development of simple nervous systems.

Moore, C.L., BA, PhD (Cantab), Faculty of Science Killam Professor in Psychology. The development of commonsense psychology and the understanding of intentionality.

Phillips, D.P., BSc, PhD (Monash), Faculty of Science Killam Professor in Psychology. Auditory perception and psychophysics, auditory neuroscience.

Robertson, H., MSc (Western), PhD (Cantab), Major appointment in Pharmacology. Molecular neurobiology, gene expression in brain, kindling and long-term changes in brain, Parkinson disease, Huntington disease, stroke.

Rusak, B., BA (Toronto), PhD (Berkeley), FRSC, Joint appointment in Psychiatry. Biological rhythms and sleep: molecular, cellular and behavioural approaches; clinical applications.

Semba, K., BEd, MA (Tokyo), PhD (Rutgers), Major appointment in Anatomy and Neurobiology. Brain mechanisms of sleep and wakefulness; circadian control of sleep; functional neuroanatomy, neurochemistry and neurotransmitters, neurophysiology, and behavioural techniques.

Stewart, S., BSc (Dalhousie), PhD (McGill), Faculty of Science Killam Professor in Psychology, Joint appointment in Psychiatry. Anxiety, substance abuse, cognitive psychophysiology.

Wassersug, R., BA (Tufts), PhD (Chicago), Major appointment in Anatomy and Neurobiology. Androgen deprivation, emasculation, gender identity, behavioural endocrinology, psycho-oncology, amphibian social and reproductive behaviour.

Associate Professors

Abbass, A., BSc (Ottawa), MD (Dalhousie), FRCPC (Toronto), Major appointment in Psychiatry. Emotion physiology, short-term dynamic psychotherapy, psychotherapy integration, anxiety, depression, somatization.

Adamo, S., BSc (Toronto), PhD (McGill). Insect behavioural neuroscience, cephalopod behaviour, invertebrate behavioural physiology.

Blanchard, C., BA (UPEI), MA, PhD (Alberta), Major appointment in Medicine. Health behaviour change, social cognitive theories, social ecological model, cardiac rehabilitation, cancer and exercise.

Breau, L., BA (MtA), PhD (Dalhousie), Major appointment in the School of Nursing. Pain management, psychological pain treatment, pain in children and adults with intellectual disabilities, outcomes in chronic pain, health problems and quality of life in people with intellectual disabilities.

Chambers, C.T., BSc (Dalhousie), MA, PhD (UBC), Clinical PhD Program Associate Director of Training, Canada Research Chair in Pain and Child Health, Joint appointment in Pediatrics. Pediatric (child health) psychology, pediatric pain.

Corkum, P., BSc (Dalhousie), MA, PhD (Toronto), Clinical PhD Program Director of Training. Sleep and childhood psychopathology; attention, behaviour and academic disorders in children; psychosocial interventions; school psychology.

Earhard, B., BA, MA, PhD (Toronto). Analytic operations in perception.

Eskes, G.A., BA, PhD (Berkeley), Major appointment in Psychiatry. Clinical and cognitive neuropsychology, cognitive rehabilitation, disorders of attention, memory and executive function, sleep disorders, aging, stroke, dementia, cognition and emotion, functional brain imaging.

Good, K., BSc (UNB), MSc, PhD (UBC), Major appointment in Psychiatry. Olfactory and cognitive function in patients with psychotic disorders, and olfactory fMRI.

Kiefte, M., BA (Memorial), MSc, PhD (Alberta), Major appointment in the School of Human Communication Disorders. Speech perception, psychoacoustics, speech production, stuttering.

McGlone, J., BA, MA, PhD (Western). Clinical neuropsychology, epilepsy, outcomes of temporal lobe resection on memory complaints and emotional intelligence, dichotic listening used for speech lateralization, sex differences in brain organization.

Perrot-Sinal, T.S., BSc, PhD (Western). Molecular mechanisms of sexual differentiation of rat brain; developmental programming of adult stress responding: sex and sex steroid modulation of adult stress responding.

Porter, S.B., BSc (Acadia), MA, PhD (UBC). Criminal behaviour, psychopathy, forensic aspects of memory, credibility assessment, and malingering/deception.

Smith, I., BA (Dalhousie), MSc (Brown), PhD (Dalhousie), Major appointment in Pediatrics. Developmental disabilities, autism, perceptual and cognitive development.

Taylor-Helmick, T.L., BA (Calgary), MSc, PhD (Dalhousie). Human memory, especially our ability to intentionally forget irrelevant or outdated information; attentional mechanisms that enable remembering and forgetting; inhibitory mechanisms in attention and memory.

Assistant Professors

Barrett, S.P., BA (StFX), PhD (McGill). Addiction, polysubstance use, alcohol, tobacco, gambling, psychiatric comorbidity, human psychopharmacology.

Crowder, N.A., BSc, PhD (Alberta). Visual neurophysiology and psychophysics. Adaptation and plasticity of visual information on processing in the cortex, contrast coding, motion detection, and speed discrimination.

Deacon, H., BSc (UPEI), PhD (Oxon). Language and literacy development across the lifespan.

Duffy, K., BA (St. Thomas), PhD (McMaster). Function, organization, and development of the mammalian visual system; impact of sensory experience on neural network development and plasticity.

Frankland, B.W., BSc (McMaster), MSc, PhD (Dalhousie). Computational modelling, statistics, cognition.

Harman, K., BSc (Toronto), MSc (Ottawa), PhD (Carleton), Major appointment in Physiotherapy. Low back pain, attention and concentration, sleep disturbance, exercise.

Ingles, J., BA (Queen's), PhD (Dalhousie), Major appointment in the School of Human Communication Disorders. Neuropsychology, aphasia, dyslexia, cognitive rehabilitation, stroke, dementia.

Jacques, S., BA (McGill), MA, PhD (Toronto). Early cognitive and language development.

Johnson, S., BA (Kalamazoo), MSc, PhD (Victoria). Clinical and cognitive neuropsychology, social cognition, neurodevelopmental and neurodegenerative disorders.

Newman, A.J., BA (Winnipeg), MSc, PhD (Oregon), Canada Research Chair in Cognitive Neuroscience. Neuroplasticity and language processing: neural bases of signed vs. spoken language; effects of deafness on brain development; gesture; second language acquisition; Aboriginal languages; neuroimaging with fMRI and ERP; clinical applications of cognitive neuroimaging.

Phillmore, L., BA (Western), MA, PhD (Queen's). Songbirds, animal behaviour and learning, seasonality, neural basis of song perception, neurogenesis.

Sherry, S.B., BA (York), MA (UBC), PhD (Saskatchewan). Personality and psychopathology (e.g., suicide, eating disorders, and depression), perfectionism, hypochondriasis.

Westwood, D.A., BSc, MA, PhD (Waterloo), Major appointment in the School of Health and Human Performance. Cognitive neuroscience, sensory control of skilled action, functional neuroimaging.

Senior Instructors

Gadbois, S., BPs, MAPs (Univ. de Moncton), PhD (Dalhousie). Candid research: Social stress, temperament, reproductive, agonistic and affiliative behaviours in wolves; food caching sequences in wolves, coyotes and red foxes; olfactory detection and discrimination in dogs. Fish research: Neuroethology (incl. behavioural ecotoxicology) of teleost fishes.

Hoffman, R.S., BA (Col Coll), MA (Dalhousie). Computer technology, experimental methods.

Leary, J., BSc (Dalhousie), MSc (MUN), PhD (Adelaide). Information processing, vision.

Schellinck, H., BSc, MSc, PhD (Dalhousie). Learning, memory and olfaction in rodents; influence of early repetitive pain on anxiety and learning in adult mice.

Stamp, J., BSc (Dalhousie), PhD (Cambridge). Stress, addiction, steroid hormones and behaviour.

Adjunct Professors

Backman, J., BA (Dalhousie), MA, PhD (Carleton), Psychology/IWK Health Centre. Learning disabilities, neuropsychology and reading.

Barresi, J., BSc (Brown), MA (S. Calif.), MS, PhD (Wisconsin). Psychology/ Dalhousie. Personology, social cognition, philosophical psychology, history of psychology.

Chipman, K., BA (UPEI), MA, PhD (Western), Psychology/Nova Scotia Hospital. Neuropsychology, memory and aging, schizophrenia.

Cohen, A.J., BA (McGill), MA, PhD (Queen's), Psychology/UPEI. Music cognition, audio-visual integration, film music perception, auditory spatial cognition, voice emotion.

Connolly, J.F., AB (Holy Cross), MA (Sask), PhD (London), Univ. de Montreal. Cognitive and clinical neuroscience, neurotrauma assessment, dyslexia and reading remediation, stroke, language, memory, event-related brain potentials, magnetoencephalography, magnetic resonance imaging.

D'Arcy, R.C.N., BSc (Victoria), MSc, PhD (Dalhousie), Institute for Biodiagnostics (Atlantic)/National Research Council Canada. Functional brain imaging, cognitive and clinical neuroscience, magnetic resonance imaging, event-related brain potentials.

Dunham, P.J., BA (DePauw), MA, PhD (Missouri), Psychology/ Dalhousie. Infant cognitive development.

Ellsworth, C., MA, PhD (Queen's), Psychology/IWK Health Centre. Neurodevelopmental disorders (infants and preschoolers), early identification, parent education and support.

Fentress, J.C., BA (Amherst), PhD (Cantab). Ethology and behavioural neuroscience.

Fisher, M.L., BA (York), MSc (McMaster), PhD (York), Psychology/Saint Mary's Univ. Evolutionary psychology, sex/gender differences, interpersonal relationships, female competition and attractiveness, applied cognition, human factors.

Fisk, J., BSc, MA, PhD (Western), Psychology/QEII Health Sciences Centre. Neuropsychology, aging, dementia and neurodegenerative disorders: assessment, diagnosis, epidemiology, risk factors, health-related quality of life, treatment effectiveness, health policy, cognitive neuroscience, neuroimaging.

Ivanoff, J., BSc, MA (Guelph), PhD (Dalhousie), Psychology/Saint Mary's Univ. Attention decison-making, executive control response preparation, cognitive neuroscience, functional magnetic resonance imaging, event-related potentials.

MacDonald, G.W., BA (StFX), MA, PhD (Windsor). Learning disabilities, developmental reading disorders, pediatric and adult neuropsychology.

Marchand, Y., MCS (Univ. of Paris), PhD (Compiegne), Institute for Biodiagnostics (Atlantic), National Research Council Canada. Computational modelling of reading, dyslexia, speech technology, event-related brain potentials.

McLeod, P., BSc (MtA), MSc (MUN), PhD (Dalhousie), Psychology/ Acadia Univ. Social and cognitive development, perceptions of control, physiology and behaviour of wild canids.

O'Neill, P., MSc, PhD (Yale), Professor Emeritus/Acadia Univ. Evolutionary psychology, sex/gender differences, interpersonal relationships, female competition and attractiveness, applied cognition, human factors. Ethical decision making, community psychology.

Rodger, R.S., MA (Edin), PhD (Queen's, Belfast). Statistical methodology; especially the evaluation of multiple, null contrasts against their alternatives (parametric and non-parametric), using decision-based error and detection rates.

Santor, D., BA (Western), PhD (McGill), School of Psychology/Ottawa. Depression, vulnerability factors, psychometrics, adolescent mental health.

Service, E., BA, MA, Lic. Phil., PhD (Helsinki), Psychology/University of Helsinki, and Montreal. Verbal working memory, language processing and learning, literacy, brain function correlates of memory and language processing.

Shaw, S.R., BSc (London), PhD (St. Andrews), Psychology/ Dalhousie. Sensory neurobiology, neural evolution and plasticity.

Smith, S.M., BA (Bishop's), MA, PhD (Queen's), Psychology/Saint Mary's Univ. Attitudes and persuasion, attitude change, behaviour change, health promotion, psychology and law, eyewitness identification issues, group communication and decision making, medical error, media and behaviour.

Song, C., BSc (East China Normal Univ), MD in Chinese Medicine (Hu Nan Medical Univ.), MSc (East China Normal Univ. and Chinese Acad. of Science), PhD (National Univ. of Ireland), Canada Research Chair in Psychoneuroimmunology, Biomedical Science, AVC/UPEI. Neurodegeneration, neuroinflammation, neurotrophic factors, microglia, neurons, neurotransmission, memory, lipids, natural products.

Symons, D., BSc (McMaster), MA, PhD (Western), Psychology/Acadia Univ. Early social development, child-clinical and family psychology, behavioural assessment, attachment and relationships, parenting, theory of mind.

Symons, S., BSc (Dalhousie), MA, PhD (Western), Psychology/Acadia Univ. Literacy development, educational psychology, learning disabilities.
Vallis, M., BSc (Dalhousie), MA, PhD (Western), Psychology/QEII Health Sciences Centre. Health psychology, diabetes, gastroenterology, cardiovascular risk reduction, obesity, motivational readiness to change, cognitive therapy.
Waschbusch, D.A., BSc (Wisconsin), MSc, PhD (Pittsburgh), Center for Children and Families/Univ. of Buffalo. Developmental psychopathology, ADHD, antisocial behaviour, peer relationships.
Watt, M., BA (StFX), PhD (Dalhousie), Psychology/St. Francis Xavier Univ. Anxiety, health behaviour, cognitive-behaviour therapy.
Yoon, M.G., BS (Seoul), PhD (Berkeley). Development of nervous systems and language.

Adjunct Assistant Professors (Clinical PhD Program)

Eligible for supervision of Clinical PhD practicum, comprehensives, and/or dissertation committee membership (but not primary dissertation supervision), as determined by the Clinical Program Coordinator.

Angelopoulos, M., PhD (Dalhousie), Psychology/QEII Health Sciences Centre
Bilsbury, C., PhD (Liverpool), Psychology/QEII Health Sciences Centre
Blood, L., PhD (Houston), Assessment Services/IWK Health Centre
Blumberg, M., PhD (Temple), Children's Acute and Continuing Care/IWK Health Centre
Boutilier, J., PhD (Queen's), Nova Scotia Youth Centre, Annapolis Valley District Health Authority/IWK Health Centre (Waterville Site)
Braha, R., PhD (Dalhousie), Psychology/QEII Health Sciences Centre
Buffett-Jerrott, S., PhD (Dalhousie), Child and Family Day Treatment Service/IWK Health Centre
Butler, G., PhD (Queen's), Psychology/QEII Health Sciences Centre
Carter, S.L., PhD (Windsor), Psychology/QEII Health Sciences Centre
Clark, S., PhD (Dalhousie), Adolescent Centre for Treatment/IWK Health Centre
Connors, A., PhD (Simon Fraser), Provincial Community Sexual Offender Program/East Coast Forensic Hospital
Corkum, V., PhD (Dalhousie), Corkum & Associates
Day, V., PhD (Queen's), Counselling and Psychological Services/Dalhousie University
Freeman, P., PhD (Manitoba), Mental Health Services - Dartmouth/Nova Scotia Hospital
Gillespie, J., PhD (Western), Pediatric Health Psychology Service/IWK Health Centre
Gorman, M., PhD (York), Psychology/QEII Health Sciences Centre
Gross, R., PhD (West Virginia), Occupational Rehab and Pain Services/Life Mark Health Centre
Gusella, J., PhD (Queen's), Psychological Services/IWK Health Centre & Private Practice
Hann, G., EdD (Indiana Univ. of PA), Breakthrough Coop Inc.
Hendrick, J., PhD (Queen's), Psychology/QEII Health Sciences Centre
Hill, T., PhD (Calgary), Operational Trauma, Stress and Support Centre/Formation Health Services for the Canadian Armed Forces
Howes, J., PhD (Western Ontario), Psychology/QEII Health Sciences Centre
Humphreys, C., PhD (Toronto), Breakthrough Coop Inc.
Jefferson, S., PhD (UNB), Psychology/QEII Health Sciences Centre
Kelln, B., PhD (Calgary), East Coast Forensic Hospital
Kennedy, N., PhD (Dalhousie), Kentville Mental Health Centre/Valley Regional Hospital
McGee, R., PhD (Western Ontario), Annapolis Valley Regional School Board
McLaughlin, E., PhD (Dalhousie), Pediatric Health Psychology/IWK Health Centre
Pencer, A., PhD (Calgary), Community Mental Health Services - Halifax Branch/ IWK Health Centre
Poisson, M., PhD (McGill), Community Mental Health - Halifax Branch/IWK Health Centre
Pure, K., PhD (UNB), Dr. Kiran Pure & Associates
Ross, M., PhD (Saskatchewan), Mental Health Services, Bedford-Sackville/Cobequid Community Health Centre
Scattolon, Y., PhD (UNB Fredericton), Eating Disorders Clinic/QEII Health Sciences Centre, and Private Practice
Sperry, J., PhD (UNB Fredericton), Dr. John Sperry & Associates Ltd.
Starzomski, A., PhD (UBC), East Coast Forensic Hospital
Swaine, J., PhD (Ottawa), Dr. John Swaine & Associates
Walford, V., PhD (Ottawa), Jason Roth & Associates
Wetmore, A., MEd (Acadia), Private Practice
Wilson, A.R., PhD (Saskatchewan), Mental Health Services, Bedford-Sackville/Cobequid Community Health Centre

Research Associates

Fröhlich, A., Diplom, Dr. rer. Nat. (Freie Universität Berlin), MSVU
Pyza, E., PhD (Jagiellonian Univ), Inst. of Zoology, Jagiellonian Univ.

Postdoctoral Fellows

Borowska, J., PhD (Jagiellonian Univ., Kraków, Poland)
Borycz, J., PhD (Polish Academy of Sciences, Kraków, Poland)
Borycz, J. A., PhD (Jagiellonian Univ., Kraków, Poland)
Darredeau, C., PhD (McGill)
Greiner, B., Dr. Phil (Univ. of Lund, Sweden), Schrödinger and Killam
Groh, C., Dr.rer. nat (Univ. of Würzburg, Germany)
Hamanaka, Y., PhD (Osaka City Univ., Japan)
Kelly, C., PhD (Toronto)
King, S., PhD (Dalhousie)
Li, M., MD, PhD (Jilin Univ., Changchun, China)
O'Connor, R.M., PhD (Washington)
Takemura, S.-Y., PhD (Yokohama City Univ., Japan)

I. Admission Requirements

Candidates must satisfy the general requirements for admission to the Faculty of Graduate Studies. Individuals interested in applying for a position in one of the Psychology programs must submit at least two letters of reference, official copies of all undergraduate and graduate transcripts, GRE scores (verbal, quantitative and analytic) and application fee. Students should have at least a B+ average in their last two years. A letter from the applicant indicating his/her research and career interests is strongly recommended. Applicants for admission to the Clinical program must submit an additional reference letter which focuses on their clinical experience and/or suitability for work in clinical psychology.

II. Degree Programs

The Department of Psychology offers graduate training leading to MSc and PhD degrees in Psychology, MSc and PhD degrees in Psychology/Neuroscience, and to a PhD degree in Clinical Psychology. Master's level students in Psychology and Psychology/Neuroscience are expected to advance into the corresponding PhD programs. The Department does not have a "terminal" Master's program nor does it offer a Master's degree in Clinical Psychology.

A. Psychology (Experimental)

The graduate programs in Psychology emphasize training for research. They are best described as "apprenticeship" programs in which students work closely with a faculty member who has agreed to supervise the student's research. Compared with many other graduate programs, the Department places less emphasis on class work and greater emphasis on research, scholarship and independent thinking.

1. Master of Science (MSc) in Psychology

In addition to the Master's thesis (PSYO 9000.00), which is the major requirement of this program, the Master's student must complete the following classes:

- PSYO 6001.03: Fundamentals of Statistics and Experimental Design
- PSYO 7500X/Y.06: Proseminar Methods of Psychological Inquiry
- At least one other full credit of elective seminar(s)

During each residency year Master's students must register for and attend the weekly colloquium series (PSYO 8000X/Y.06) and are required to do some teaching in the undergraduate program. The minimum amount of teaching is presently the equivalent of no more than 10 hours/week for one term. This consists of working as a laboratory instructor, seminar leader, or teaching assistant.

2. Doctor of Philosophy (PhD) in Psychology

Students are expected to conduct research leading to empirical, methodological and/or theoretical advances in their field of study, some or all of which will be included in their dissertation and defended publicly. In addition to the dissertation (PSYO 9530.00), which is the major requirement of this program, students in the PhD program must complete the following classes (unless they were completed as part of the Master's program):

- PSYO 6001.03: Fundamentals of Statistics and Experimental Design, and at least one other ½ credit class in the quantitative/analytic area
- PSYO 7100.03: Seminar in Teaching Effectiveness
- PSYO 7500X/Y.06: Proseminar: Methods of Psychological Inquiry
- 1 full credit of elective (with approval, this may be taken outside the department) seminar(s)

During each year in the PhD program students are required to register for Dissertation Research (PSYO 9530.00) and are encouraged to enrol in graduate seminars. During each residency year students must register for and attend the weekly colloquium series (PSYO 8000X/Y.06) and do some teaching in the undergraduate program (see Master's program description). At least one year before submission of the dissertation students must also satisfy the comprehensive examination requirement. This requirement, which is administered by an examination committee of between three and five faculty members, entails completing at least three comprehensive 'projects' that are not directly related to the student's dissertation research.

B. Psychology/Neuroscience

The graduate programs in Psychology/Neuroscience are coordinated by the Psychology Department and an interdisciplinary Neuroscience Program Committee with representation from the Departments of Anatomy and Neurobiology, Biochemistry and Molecular Biology, Pharmacology, Physiology and Biophysics, and Psychology (see Neuroscience calendar entry). They are also designed as "apprenticeship" programs in which students work closely with a Neuroscience faculty member who has agreed to supervise their research. Emphasis is placed on interdisciplinary research, scholarship and independent thinking rather than on class work.

1. Master of Science (MSc) in Psychology/ Neuroscience

In addition to the Master's thesis (PSYO 9000.00), which is the major requirement of this program, the Master's student must complete the following classes:

- NESC 6100X/Y.06: Principles of Neuroscience
- PSYO 7500X/Y.06: Proseminar: Methods of Psychological Inquiry
- Students are expected to take at least ½ credit of class work in the quantitative/analytical area

During each residency year Master's students must register for and attend a weekly colloquium series offered by one of the participating departments (such as PSYO 8000X/Y.06) and are required to do some teaching in the undergraduate program. The minimum amount of teaching is presently the equivalent of no more than 10 hours/week for one term. This consists of working as a laboratory instructor, seminar leader, or teaching assistant. Master's students must register for PSYO 9000.00 (Thesis). The Neuroscience and Psychology Graduate Program Committees, in collaboration with the student and supervisor, will assess the needs of the student and determine any other requirements beyond the minimum outlined above.

2. Doctor of Philosophy (PhD) in Psychology/ Neuroscience

Students are expected to conduct research leading to empirical, methodological and/or theoretical advances in their field of study, some or all of which will be included in their dissertation and defended publicly. In addition to the dissertation (PSYO 9530.00), which is the major requirement of this program, students in the PhD program must complete the following classes (unless they were completed as part of the Master's program):

- NESC 6100X/Y.06: Principles of Neuroscience
- PSYO 7100.03: Seminar in Teaching Effectiveness
- PSYO 7500X/Y.06: Proseminar: Methods of Psychological Inquiry

During each year in the PhD program students are required to register for Dissertation Research (PSYO 9530.00) and are encouraged to enrol in graduate Neuroscience and/or Psychology seminars. During each residency year students must register for and attend a weekly colloquium series offered by one of the participating departments (such as PSYO 8000X/Y.06) and do some teaching in the undergraduate program (see Master's program description). The Neuroscience and Psychology Graduate Program Committees, in collaboration with the student and supervisor, will assess the needs of each student and determine any other requirements beyond the minimum outlined above. At least one year before submission of their dissertation students must also satisfy the comprehensive examination requirement. This requirement, which is administered by an examination committee of between three and five faculty members, entails completing at least three comprehensive 'projects' that are not directly related to the student's dissertation research.

C. Doctor of Philosophy (PhD) in Clinical Psychology

The PhD program in Clinical Psychology is cooperatively administered by the Psychology Department and the Clinical Program Committee with representation from Acadia University, Dalhousie University, Mount Saint Vincent University, Saint Mary's University and professional psychologists from the teaching hospitals and the community. It is a CPA accredited, structured, five-year program which follows the "scientist-practitioner" model. It considers clinical psychology as part of the science of psychology and therefore emphasizes research.

Upon admission, students are assigned to a faculty member who will supervise their thesis and other research projects. During the first four years of the Clinical PhD program, students complete required and elective classes, conduct supervised and thesis research, and gain clinical experience through field placements (PSYO 8333X/Y.06, a minimum of 600 hours are required). Students are involved in research from the outset, and are expected to conduct research leading to empirical, methodological and/or theoretical advances in their field of study, some or all of which will be included in their dissertation and defended publicly. In the fifth year, students complete a full-year clinical internship (PSYO 9100.00). The Department does not offer a Master's degree in the Clinical PhD program, but students entering with a Master's degree in Psychology may receive advanced placement.

The following classes are required:

- PSYO 6001.03: Fundamentals of Statistics and Experimental Design. At least one other credit class in the quantitative/analytic area.
- PSYO 6003.03: Multivariate Statistics
- PSYO 6201.03: Psychological Assessment: Child
- PSYO 6202.03: Psychological Assessment: Adult
- PSYO 6206.03: Interviewing and Intervention: Child
- PSYO 6207.03: Interviewing and Intervention: Adult
- PSYO 6216.03: Psychopathology and Treatment: Child
- PSYO 6217.03: Psychopathology and Treatment: Adult
- PSYO 6221.03: Advanced Clinical Intervention: Child
- PSYO 6222.03: Advanced Clinical Intervention: Adult
- PSYO 6800.03: Clinical Neuropsychology
- PSYO 7100.03: Seminar in Teaching Effectiveness
- PSYO 7500X/Y.06: Proseminar: Methods of Psychological Inquiry
- PSYO 8000X/Y.06: Psychology Colloquium
- PSYO 8005.03: Research Seminar
- PSYO 8010X/Y.06: Clinical Rounds/Case Conference
- PSYO 8201.03: Ethics and Professional Decision-Making
- PSYO 8333X/Y.06: Field Placements
- At least three half credits (or equivalent) of elective seminars must also be completed.

Students in year one of the program are required to register for PSYO 5000X/Y.06 (Assignment Research). Students must register for Dissertation Research (PSYO 9530.00) throughout their program. During each residency year students must register for and attend the weekly colloquium series (PSYO 8000X/Y.06), and do some teaching in the undergraduate program. The minimum amount of teaching is presently the equivalent of no more than 10 hours/week for one term. This consists of working as a laboratory instructor, seminar leader, or teaching assistant.

At least one year before submission of their dissertation students must also satisfy the comprehensive examination requirement. This requirement, which is administered by an examination committee of between three and five faculty members, entails completing at least three comprehensive 'projects' that are not directly related to the student's dissertation research. For further detailed information, please refer to the Clinical Curriculum & Information Brochure on the departmental website.

III. Class Descriptions

Required classes are offered on a regular basis. Those classes required for the Clinical Psychology PhD Program are normally restricted to those students enrolled in the Clinical Psychology PhD Program. Coordinator and Instructor approval is required for non-Clinical Psychology graduate students to register for clinical classes. Other classes are offered, and seminar topics chosen, on the basis of faculty interests and student needs. NOTE: Not all classes are offered every year. Please consult the current timetable to determine this year's class offerings.

PSYO 5000X/Y.06: Research Assignment.

Students become actively involved in ongoing research in the laboratory of a faculty supervisor. In addition to research training, this class aims to improve the student's oral presentations and scientific writing. A final report (e.g. in the form of a Journal article) is required.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

PSYO 5001.03/5002.03: Independent Study.

Students work closely with a faculty supervisor on a topic of mutual interest. Study may focus on laboratory research or library research and empirical, methodological, theoretical and/or professional issues may be covered. A final report is required.

PSYO 6001.03: Fundamentals of Statistics and Experimental Design.

This class will survey some common parametric statistical procedures in psychology, including analysis of variance and covariance. Major emphasis is placed on the general linear model and how best to apply the model as a function of the type of data, experimental design, and hypotheses under investigation. Some knowledge of basic statistics is assumed.
INSTRUCTOR(S): B.W. Frankland

PSYO 6003.03: Multivariate Methods.

This class will cover a variety of topics in multivariate statistics, such as factor analysis, regression, multivariate analysis of variance and covariance, and discriminant function analysis. Some topics in categorical data analysis may also be covered, such as multiway frequency analysis and logic models.

PSYO 6051.03: Neural Basis of Perception.

This seminar class explores the correlations between 1) stimulus properties and neural responses produced by sensory stimulation and 2) the neural coding of environmental events and the behaviors that may be produced in the context of these events. These correlations will be studied within the auditory, visual and tactile modalities.
INSTRUCTOR(S): Staff

PSYO 6060.03: Biological Basis of Mental Illness.

This seminar class explores our current understanding of the physiological mechanisms that may underlie various forms of abnormal behavior. Its subject matter includes disorders for which a physiological mechanism has been identified as well as those for which a physiological basis is currently a matter for speculation. This class is intended for graduate students with backgrounds in some aspects of neuroscience and clinical psychology.

PSYO 6071.03: Topics in Behavioral Neuroscience.

This seminar class covers contemporary, fundamental topics in physiological psychology, including methods, research and/or theory. Various topics such as brain mechanisms of reinforcement, hormones and behavior, and biological rhythms, will be covered in different years.
INSTRUCTOR(S): R.E. Brown
FORMAT: Seminar
PREREQUISITE: PSYO or NESC graduate student
CROSS-LISTING: NESC 6071.03

PSYO 6081.03: Topics in Personality and Social Psychology.

Different topics in personality and social psychology (such as psychology of persons, attitude formation, group dynamics) are covered in a seminar format.
INSTRUCTOR(S): Staff

PSYO 6091.03: Topics in Child Development.

Different topics in child development (such as language acquisition, social development, meta-cognitive processes) are covered in a seminar format.
INSTRUCTOR(S): C. Moore

PSYO 6101.03: Computers and Instrumentation in Psychology Experiments.

This class provides an overview of the use of computers in psychological experimentation. Topics may include: real-time issues, input and display devices, platform and operating system differences, web-based experiments, and current experimental packages. Class work will include an introduction to programming and the development of a small-scale computerized experiment.

PSYO 6160.03: Comparative Psychology.

Different topics in comparative psychology (such as kin selection, parental behavior, hormonal control of behavior, olfaction and behavior) are covered in seminar format.

PSYO 6201.03: Psychological Assessment: Child.

This class addresses the theoretical and applied foundations of psychological measurement. Historical, theoretical and psychometric issues are addressed to provide the students with a sound knowledge base in issues related to test development, including various forms of validity and reliability, as well as research designs in test development. The second part of the class emphasizes the development of skills in the assessment of cognitive abilities, personality, behavior and emotional functioning. Students learn to administer, score and interpret performance on a variety of assessment instruments for children. Report writing skills are developed through case studies. Computer-based test administration and interpretation are also addressed.
INSTRUCTOR(S): S. Johnson

PSYO 6202.03: Psychological Assessment: Adult.

This class is the adult equivalent of PSYO 6201.03 and is organized to complement material covered in the first term. The emphasis is on adult assessment.
INSTRUCTOR(S): S. Barrett

PSYO 6206.03: Interviewing and Intervention: Child.

This class emphasizes the development of skills in clinical interviewing. Class content focuses on the applications of different modes of interviewing, applications to different populations, social and cultural factors, the examination of variations in style of interaction, the different phases of an interview, and building a working relationship. Students learn how to structure interviews according to specific assessment and intervention goals. The class also focuses on the development of skills in diagnostic interviewing. Students become familiar with the classification system of the DSM-III-R, DSM-IV, hierarchical decision trees, and differential diagnosis. Students view training tapes, as well as case vignettes of interviews with patients with various psychological disorders. Other multiaxial taxonomies (e.g., ICD-9/10), and dimensional classification systems (e.g., Achenbach's Child Behavior Profiles) will also be examined. This class also provides broad coverage of theory and application of psychological intervention techniques including psychotherapy, behavior modification, counselling, crisis management, and social advocacy. Special issues related to the provision of psychological services in rural communities are examined.

PSYO 6207.03: Interviewing and Intervention: Adult.

This class is the adult equivalent of PSYO 6206.03. The emphasis is on Adult Interviewing and Intervention.

PSYO 6211.03: Topics in Assessments.

Different topics in assessment are covered in a seminar format.

PSYO 6216.03: Psychopathology and Treatment: Child.

This class examines the different approaches to the study and treatment of psychopathology. The class examines historical and social aspects of research on psychopathology and highlights issues of current concern. Emphasis is placed on human and animal literature addressing the bases of psychological disorders. Research addressing the efficacy of psychological and pharmacological interventions is also examined. One of the aims of the course is to familiarize students, from an empirical perspective, with the applications as well as limitations of different intervention modalities.
INSTRUCTOR(S): S. Johnson

PSYO 6217.03: Psychopathology and Treatment: Adult.

This class is the adult equivalent of PSYO 6216.03. The emphasis is on Adult Psychopathology and Treatment.
INSTRUCTOR(S): S. Porter

PSYO 6218.03: Topics in Psychopharmacology.

This seminar class examines the neural and behavioral effects of drugs. The agonist and antagonist actions of drugs on receptors for neurotransmitters and the effects of drugs on neurotransmitter synthesis, storage, release and deactivation are covered. Aimed specifically at psychologists, the class focuses on the use of drugs to treat clinical disorders such as depression, schizophrenia, Alzheimer's disease, etc.

PSYO 6221.03: Advanced Clinical Intervention: Child.

This class focuses on a wide range of theoretical and applied aspects of intervention. The class comprises a didactic component, as well as direct participation in evaluation, case planning and intervention. The didactic component focuses on instruction in case conceptualization, treatment planning, and treatment evaluation. Part of the class will be conducted through a clinical service in the community. Students will be required to conduct psychological evaluations of patients and participate in treatment interventions.
INSTRUCTOR(S): Staff

PSYO 6222.03: Advanced Clinical Intervention: Adult.

This class is the adult equivalent of 6221.03. The emphasis is on Adult Advanced Clinical Intervention.
INSTRUCTOR(S): Staff

PSYO 6240.03: Topics in Animal Learning.

Different topics in the field of animal learning (such as classical and operant conditioning, quasi-neural modeling of learning phenomena, etc.) are covered in a seminar format.
INSTRUCTOR(S): V.M. LoLordo

PSYO 6313.03: Topics in Cognitive Psychology.

Varied topics in cognitive psychology (such as theories of attention, memory and amnesia, cognitive inhibition) are covered in a seminar format.
INSTRUCTOR(S): R. Klein, P. McMullen

PSYO 6330.03: Topics in Forensic Psychology.

Forensic Psychology deals with the applications of psychological principles and methods to various aspects of the criminal justice system (i.e., the courts, corrections, policing). Coverage of this broad topic will vary from a general overview of the field to specific topics of interest to the students. Whatever the topic, professional and ethical issues will be addressed and the complexities of conducting research on psycho-legal issues will be explored.
INSTRUCTOR(S): S. Porter

PSYO 6410.03: Topics in Therapeutic Intervention.

This seminar class will focus on specific types of intervention. Topics, which may vary from year to year, may include: crisis intervention, feminist therapy, operant interventions, family therapy, marital therapy, sex therapy, cognitive behavior therapy, individual psychotherapy, pharmacotherapy, etc.

PSYO 6420.03: Topics in Health Psychology.

This seminar class will examine specific topics concerning the inter-relationship between physical health and psychology. Topics, which may vary from year to year, may include: pediatric psychology, pain, health in the aged, health promotion, cardiovascular disease, etc.
INSTRUCTOR(S): C. Chambers

PSYO 6580X/Y.06: History of Psychology.

In writing dating from antiquity to the early years of the 20th century we explore the understanding of such abiding sources of our curiosity as individual, racial and sexual differences, the distinctions between man and animal, the sources of odd actions, the nature of the brain and of vision
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

PSYO 6800.03: Clinical Neuropsychology.

This class emphasizes the development of a knowledge base by surveying several aspects of clinical neuropsychology. Topics include neuroanatomy, neurological exam, investigations and diseases, models of neuropsychological assessment, dementia, epilepsy, localization of function, cognitive remediation, theories of aphasia, amnesia, and agnosia.
INSTRUCTOR(S): J. McGlone

PSYO 6803.03: Topics in Psychopathology.

Topics in psychopathology, which may vary from year to year, include: anxiety, child psychopathology, drug abuse, schizophrenia.

PSYO 6804.03: Topics in Neuropsychology.

These seminars will vary from term to term and will focus on specific aspects of neuropsychology. Topics may include: localization of function, neuropsychological assessment, neurological, psychiatric and medical neuropsychology, cognitive rehabilitation, child neuropsychology, aphasia, amnesia, agnosia and apraxia.

PSYO 6820.03: Topics in Community Psychology.

The focus of this seminar will be on the delivery of psychological services in community settings. The topics will vary from year to year depending on the needs of the class and the expertise of the instructor.

PSYO 7100.03: Seminar in Teaching Effectiveness.

Students currently engaged as Teaching Assistants in PSYO 2000.03 must concurrently enroll in this class, which has two components: 1) a weekly meeting in which all students meet to discuss general and specific issues related to class planning, assessment of student performance and dealing with problems; 2) actual teaching experience in class for 2 hours/week. Teaching performance is intermittently observed and feedback provided on an individual basis.
INSTRUCTOR(S): R. Hoffman

PSYO 7500X/Y.06: Proseminar: Methods of Psychological Inquiry.

With the assistance of regular and adjunct faculty in the Department of Psychology all new students are exposed to the broad range of topics in Psychology as well as a sampling of methodologies used to study behavior (human and animal) as well as its neural underpinnings. In addition, the class aims to develop the student's communication skills (oral, writing, poster presentation) and research ability.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): R. Klein, Coordinator

PSYO 8000X/Y.06: Psychology Colloquium.

Students enrolled in this class are required to attend the weekly colloquium series.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

PSYO 8005.03: Research Seminar.

This class focuses on theoretical and substantive aspects of research design. Topics include reliability and validity of measurement, correlational, quasi-experimental, and experimental designs, measurement redundancy, and power analysis. Students present on selected topics, as well as present on design issues related to their dissertation.
INSTRUCTOR(S): S. Sherry

PSYO 8010X/Y.06: Clinical Rounds/Case Conference.

All students are expected to attend clinical rounds and presentations in various clinical settings in the community. Students are also expected to attend clinical case conferences that will be held on a monthly basis through the Fall and Winter terms. Clinical psychologists from the community and senior students are invited to present cases from their clinical practice. The aim of this class is to familiarize students with different ways of conceptualizing psychological problems, planning and initiating interventions, and evaluating outcome. Evaluation is based on student attendance and participation.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): P. Corkum

PSYO 8201.03: Ethics and Professional Decision Making.

This class covers ethical and professional issues arising in various fields of psychology, including clinical practice and research. Students will be encouraged to develop a methodology for appraising their ethical and professional behavior through an understanding of such issues as the legal regulation of psychology, codes of ethics and professional standards, and malpractice. The class will introduce students to the concepts of quality and risk, and explore the relationship between psychology and other professions in multi-disciplinary contexts. The class will also examine the relation between psychology standards and standards established by organizations in which psychologists work, such as health facility accreditation.
INSTRUCTOR(S): Staff

PSYO 8333X/Y.06: Field Placements.

Students are assigned to field placements in co-operating institutions where the student will spend one day per week (or equivalent). Placements are individually arranged to provide the student with experience in a variety of clinical environments. Field placements are coordinated and monitored by the Clinical Program Committee. Students who are assigned to field placements will present case reports in a weekly one-hour seminar. Students must complete a minimum of 600 practicum hours before they can register for the predoctoral internship (see Practicum Guidelines).
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.
INSTRUCTOR(S): Staff

PSYO 9000.00: MSc Thesis.

PSYO 9100.00: Pre-Doctoral Internship.

A 12-month, full-time internship in an approved setting is required. Typically, the internship setting will be accredited by the Canadian Psychological Association or the American Psychological Association.
INSTRUCTOR(S): S. Stewart, Coordinator of Clinical Program

PSYO 9530.00: PhD Thesis.

Public Administration

Location: 6100 University Avenue, 3rd Floor
Halifax, NS B3H 3J5
Telephone: (902) 494-3742
Fax: (902) 494-7023
Email: DalMPA@dal.ca
Website: http://www.spa.management.dal.ca

Director of School

Siddiq, F.

Graduate Coordinator

Roy, J.

Professor Emeritus

Pross, A.P., BA, MA (Queen's), PhD (Toronto)

Professors

Aucoin, P., BA (SMU), MA (Dal), PhD (Queen's), jointly with Political Science. Government organization, public management reform
Brown, M.P., BA (MtA), MA (Dal), PhD (Toronto). Organizational analysis, political culture and public policy, forestry and environmental policy, Nova Scotia political economy
Siddiq, F.K., BA, MA (Dhaka), PhD (Dal). Income and wealth distribution, economic inequality and well-being, public debt management
Sullivan, K.C., BSc, BEd (Dal), MEd, PhD (Alta). Technology use in public administration and analysis of organizational culture
Traves, T., BA (Man), MA, PhD (York), President and Vice-Chancellor, Dalhousie University, jointly with History

Associate Professor

Roy, J., BA (Waterloo), MBA (Ottawa), Phd (Carleton). Electronic government, public-private partnerships, public service transformation, ethics and corporate governance and democratic engagement

Assistant Professors

Cassin, A.M., BA (Man), MA (UBC), PhD, (Toronto). Public sector management, gender relations, career advancement, community economic development
Quigley, K., BA (Queen's), MSc. (London School of Economics & Political Science, London Uk), Phd (Queen's University, Belfast, Uk). Comparative public sector risk and crisis management, strategic management and critical infrastructure protection.
Wranik, D., Health Economics, Health System Efficiency, Physician Remuneration Models, Health Service Delivery Models, Health Technologies Assessment and its use in policy making, Health Policy Design and Evaluation

Adjunct Professors

Chaytor, K. BA (Mt. St. Vincent), MA, PhD (Dal)
Durier-Copp, M., BA, MA, PhD (McGill)
Fanjoy, E., BSc (Hons) (UNB), LLD (UNB)
Fullerton, R.W., BSc (Dal), MED (Toronto), PhD (Union Institute)
Gilbert, M., BSc (SMU), MBA (Dal), PhD (Brad)
Haworth, R., BSc (Durham), PhD (Cambridge)
Lopes, B., BA (SMU)
Smart, D., BA (Carleton), MSc (NRS Washington DC)

Special Lecturers

Crowell, T. BComm, MBA (St. Mary's)
Davies, M. BSc., (McGill), MSc. (Glasgow), MPA (Dal)
Hennebury, B. BComm (St. Mary's), MPA (Management) (Dal)
McNiven, J. BA, Ph.D (Michigan)
Nethercote, W. BEng. (Carleton), MSc (Newcastle)
Tucker, D. BComm. (Mt. Allison), MBA (Management) St. Mary's

Students seeking further information or help in planning classes of study in the School of Public Administration should address themselves to:

Graduate Coordinator
School of Public Administration
6100 University Avenue
Halifax, NS B3H 3J5
Telephone: (902) 494-3742
Fax: (902) 494-7023

I. Degree Programs (General)

The graduate programs of the School are designed to provide the professional education essential to a career in modern public service. They are offered to students who either are preparing for initial employment or are returning to university with work experience. The School's location in Dalhousie's Faculty of Management allows students to develop an MPA program, consisting of eighteen half credits, that links public administration to business, the environment and the information sciences.

The programs are professional in that they equip students with both the administrative skills required in public sector management and an understanding of the organization, process, and activities of government. Each component is essential, and consequently required of all students. They are expected to achieve an expanded awareness of the public interest and a personal appreciation of the ethical standards and comptroller principles appropriate to a career in the service of the public. The professional requirements have been developed in consultation with senior officials of all levels of government (including graduates of the School).

GDPA and MPA

Admission requirements for the GDPA and the MPA are those of the Faculty of Graduate Studies, and its standards must be maintained throughout the duration of the program. The quantity and quality of work expected in individual classes will reflect the high scholarly standards of graduate education.

The curriculum encompasses the essential components of financial, human resources and statistical techniques on the one hand, and economic, organizational and policy analysis on the other. The Graduate Diploma program and the first year of the two-year MPA program require students to complete classes in these basic fields.

Students in the second year will develop their program from the offerings in the School and may elect to take up to three half credits from classes outside the School. Elective classes proposed from outside the school must be relevant to the field of Public Administration and approved by the graduate coordinator. These include classes from other academic units at Dalhousie or other universities provided they have some public sector content.

A one-year MPA, consisting of nine half credits of class work, may be considered for students who have completed, with a first-class standing, a BA honours degree in public administration. Admission to the one-year MPA may also be based on completion, with first-class standing, of an MA degree in these academic areas or a professional graduate-level degree in a field relevant to public administration (i.e., with public sector content). Class work in the honours degree and/or the masters program must have included at least four of the nine class credits required in the first year of the two-year MPA program.

A Dalhousie Bachelor of Management graduate with a cumulative GPA of 3.7 (A-) or higher over the four-year duration of the program can be accepted into the one-year MPA. The MPA Coordinator shall determine the required classes the student must take to satisfy the requirements of the one-year MPA program consisting of nine (9) half-credit courses. If the student does not have a 3.7 GPA, but has completed classes relevant to the MPA program with A- grades or higher, he/she may be given advanced standing on a case by case basis. The classes for which advanced standing is to be granted shall be determined by the MPA Coordinator.

LLB/MPA

The School of Public Administration and the Faculty of Law offer a joint LLB/MPA program. The program allows students to take the two degrees simultaneously and to complete them in four years, rather than in five years as is the case if each is taken independently. Students interested in entering the joint program should apply separately to both the School of Public Administration and the Faculty of Law, indicating on their applications that they wish to enter the LLB/MPA program. The closing date for applications for the LLB is the end of February.

Students in the LLB/MPA program will be eligible to take three PUAD elective classes and one elective outside the PUAD course offerings. The Senior Seminar: Ethics, Public Service, and Governance (PUAD 6000.03) class and Modern Comptrollership class (PUAD 6100.03) are not a required classes for LLB/MPA students, but may be taken as elective classes.

MPA/MLIS

As the information-based economy continues to develop, it is clear that employees must be effectively equipped with technical and professional competencies to survive and prosper in public sector environments. In response to this need, the School of Public Administration and the School of Information Management are jointly offering the only dual, MLIS/MPA degree program. The joint program allows students to complete the two degrees simultaneously and to complete them in three years rather than in four years, if each is taken independently. Students should apply separately to both the School of Public Administration and the School of Information Management.

II. Application Procedures

Application forms are available from the Admissions Office of Dalhousie University. Applications should be submitted as early as January and not later than June 1 in the academic year in which studies are to commence.

Admission decisions are made on a continuing basis from January until the program quota is reached.

A. General Admission Requirement for GDPA and MPA

Enrollment in the School is limited. Normally, competitive applicants will have attained a good second class standing (B+ (3.3 GPA) average) in their last twenty half credits of university work.

Admission is based on an assessment of:

- All previous academic work;
- Two letters of reference;
- TOEFL (Test of English as a Foreign Language), for English as a second language students only, a minimum score of 580 is required for acceptance in the Faculty of Graduate Studies. The TOEFL score must be submitted at the time of application; In addition to the TOEFL score, English as a second language students must also submit one of the following tests; the Graduate Management Admissions Test (GMAT); the GRE or the Law Standards Admissions Test (LSAT).

In summary it is imperative that in addition to your application we receive:

- A statement of career interest (one page should be sufficient);
- A current résumé;
- At least two academic letters of reference;
- A TOEFL score and GRE/GMAT (if applicable)

Although not required except for international students, all students may submit a score from the Graduate Management Admission Test (GMAT) in support of their application.

The Dalhousie School of Public Administration GMAT Number is 0957.

Applicants for the test should use an order form obtainable from the Registrar's Office of the nearest University, Dalhousie University, or you may write to the address below to obtain an information bulletin and registration form for the GMAT. If the order form is lost or omitted from the materials you receive, you should write directly to:

Graduate Management Admission Test
Educational Testing Service
Box 966
Princeton, NJ, 08540, U.S.A.

For further information, contact the Administrative Secretary of the School.

B. Part-time Study

The programs offered through the School are available to students on a part-time basis. A part-time student may enrol in up to two and one-half full credit classes (five half credits) during the 12 months, September to August.

In order to ensure that graduate students benefit from a reasonable concentration of their studies, part-time programs leading to the GDPA must be completed within four years, and part-time programs leading to the MPA must be completed within six years.

III. Degree Programs

A. Graduate Diploma in Public Administration (GDPA)

The Graduate Diploma in Public Administration is a one-year, 9 half credit, graduate program designed for public servants who hold a first degree, and for students wishing to obtain professional preparation for a career in public administration.

Class Requirements

The GDPA requires the successful completion of nine half credits:

- MGMT 5000.03: Management Without Borders
- PUAD 5100.03: Organizational Designs for Governance and Public Management
- PUAD 5120.03: Introduction to Public Policy
- PUAD 5130.03: Managerial Economics
- PUAD 5131.03: Public Economics
- PUAD 5140.03: Quantitative Methods for Public Sector Management
- PUAD 5150.03: Public Sector Accounting
- PUAD 5170.03: Public Sector Human Resources Management
- PUAD 5180.03: Introduction to Policy Analysis and Applied Research Methods

When a student has a demonstrated competence in the area of a required class, an alternate class may be substituted if approved by the Graduate Co-ordinator.

B. Master of Public Administration (MPA)

The MPA is an eighteen half-credit graduate program designed for individuals prepared to undertake advanced professional study. Individual programs will vary in content to reflect each student's background and interests, while at the same time recognizing the central principles and functions of public administration.

Class Requirements

The two-year MPA will require the successful completion of eleven required half credits plus seven electives. In the first year, students must take nine half credits which must include:

- MGMT 5000.03: Management Without Borders
- PUAD 5100.03: Organization Designs for Governance and Public Management
- PUAD 5120.03: Introduction to Public Policy
- PUAD 5130.03: Managerial Economics
- PUAD 5131.03: Public Economics
- PUAD 5140.03: Quantitative Methods for Public Sector Management
- PUAD 5150.03: Public Sector Accounting
- PUAD 5170.03: Public Sector Human Resources Management
- PUAD 5180.03: Introduction to Policy Analysis and Applied Research Methods

In the second year, students must take the following two required half credits plus seven half credit electives:

- PUAD 6000.03: Ethics, Public Service and Governance
- PUAD 6100.03: Modern Comptrollership

The remaining seven credits will be electives, depending primarily on the student's area of concentration. Some advanced placement, resulting in a reduction of credits, may be granted to well qualified candidates.

The one-year MPA will require the successful completion of up to nine half credits including up to three half credits from the 5000-level classes, the Senior Seminar: Ethics, Public Service and Government (PUAD 6000.03) and five electives.

C. The LLB/MPA Program

The combined LLB/MPA program is a four-year program which enables students to select classes leading to degrees of Master of Public Administration and Bachelor of Laws. A total of thirteen half-credit Public Administration classes are required and the suggested order of the program is:

Year 1

- First year classes of the MPA program (9 half-credit required classes)

Year 2

- First year classes of the LLB program

Year 3

- Two half credits from the MPA program
- Civil Procedure
- Constitutional Law
- Compulsory Moot
- Plus 12-14 credit hours of classes from the LLB program including a major paper class

Year 4

- Second year required class PUAD 6100 plus one elective class from the MPA program.
- 23-25 credit hours of classes from the LLB program, which must include The Legal Profession and Professional Responsibility, and a major paper class

Candidates for the LLB/MPA program must satisfy the entrance requirements of both the MPA and LLB programs, and may obtain further information about the combined program by writing to the School of Public Administration and the Faculty of Law. For admission, students must apply to both the School of Public Administration and the Law School individually. Students applying for the MPA program may submit LSAT results in lieu of GMAT results.

D. MPA/MLIS Program

The combined MPA/MLIS program is a three-year program which enables students to select classes leading to degrees of Master of Public Administration and Master of Library and Information Studies. A total of fifteen half-credit Public Administration classes are required and the suggested order of the program is:

Year 1 (8 classes)

- Concentration in Library and Information Studies

Year 2 (9 classes)

- 8 first year required classes of the MPA program excluding MGMT 5000 (if it was taken during the first year of the MLIS) and one elective course for a total of 9 classes

Year 3 (10 classes)

- 4 classes in Library and Information Studies
- 2 second year required classes (PUAD 6000 & 6100) plus 4 Public Administration elective classes

Advanced Standing

Advanced Standing of up to nine half credits (one year) may be granted to students who have completed graduate level classes which are relevant to the Masters in Public Administration Program but which have not been used towards another degree. Students are advised to seek advanced standing when they apply for admission.

The Internship Program

The internship provides for formal integration of practical public service experience with academic studies in the MPA program. It involves work by students for employers in the public sector on projects deemed to be significant by the employer and appropriate to the skills of career-oriented graduate students. The terms of reference are established through consultation between the student, the participating employer, and the School.

The opportunity for an internship placement is normally available to students who have completed one year of class work.

Previous work placements have been in the federal, provincial and municipal levels of government, international and non-governmental organizations and in the private sector. PUAD 6855.03: Internship/Co-op counts as one half credit course. **Please Note: In addition to the course fee there is also an administrative fee charged by the School. For further details about this fee, please consult the School.**

E. MPA (Management)

The MPA (M) program is one of the finest examples of blended learning at the graduate level in Canada, combining distance learning with classroom instruction. This cutting-edge Master's degree is specifically designed for dedicated and goal-oriented mid-career public servants.

The MPA (M) emphasizes the theory, analysis and practice of public policy and management. Dalhousie professors, in collaboration with public sector specialists, authored the MPA(M) courses to address the specific concerns and realities of today's public sector. A management team from the School of Public Administration ensures that the courses are integrated yet individually focused, and that the curriculum builds a firm academic foundation for the practice of public administration.

The program focuses on core public administration disciplinary areas including human resource management, public policy, economics, accounting and research methods. It also emphasizes people, relationships and organizational culture, and addresses transparency, ethics, accountability, integrity, leadership and change.

Educational methods use interactive, web-facilitated instruction, classroom sessions and problem-based evaluation. The varied means of learning allow candidates to develop the skills and analytical ability necessary to successfully address current issues and priorities in the public sector.

Each class ends with a mandatory 2.5-day classroom session. These sessions provide each student with individual attention from the instructor and the opportunity to share invaluable perspectives with fellow professionals from across the public sector.

Students seeking further information should contact the Centre for Advanced Management Education (CFAME), Faculty of Management, Dalhousie University at 1-800-205-7510 and ask for an application package or contact the CFAME Office by e-mail at cfame@dal.ca

IV. Class Descriptions

Required First Year Classes

MGMT 5000.03: Management Without Borders: A Foundation Course for Masters Students in Management.

This course places management in its broadest context and helps students from diverse disciplines understand the complex social, economic, ecological, political and technological forces shaping 21st century leadership in the public, private and non profit sectors. Key themes explored in the course include systems thinking, values based approaches to management, and personal and professional development.
NOTE: Public Admin students please see the printed calendar for additional information.
INSTRUCTOR(S): D. Wheeler/P.Brown
FORMAT: Lecture/discussions

PUAD 5100.03: Organizational Designs for Governance and Public Management.

This class examines the organizational designs of government for the purposes of governance and public management. It encompasses the basic constitutional and political designs of government; the structures and principles governing the relationship between the partisan-political and non-partisan public-service institutions of government; the organization and roles of the central executive and corporate policy and management agencies; the organization of portfolios, departments and agencies for the management of policy and operational functions; and, the structures and processes of accountability for governance and public management. The class is focused on the Canadian system of government but addresses basic questions of organizational theory and design in a comparative context.
INSTRUCTOR(S): P. Aucoin

PUAD 5120.03: Introduction to Public Policy.

This class provides a general introduction to the field of policy management, for graduate and honours undergraduate students. Using British 'best practice' ideas of professional policy making and Canadian statements of generic policy competencies, it seeks to improve the policy capacity of participants. It does this first by increasing their knowledge of public policy structures, processes, and outputs, and secondly, by giving them knowledge that they can use in policy advocacy both inside and outside government. The first section of the class examines policy definitions and professional policy making approaches in the 21st century. The second section considers the role of the state in the 21st century, and the policy competencies that analysts must have if that role is to be carried out effectively. Section three explores vertical, horizontal and external policy relationships, both as determinants of policy and as practical matters of management. Section four explores, and helps participants to gain proficiency in, the most recent processes of strategic policy design and implementation. This blend of theory and practice will increase the policy knowledge of all participants, and equip those who are in professional programs, including the various public services, to contribute more effectively in policy processes in the future.
INSTRUCTOR(S): P. Brown
CROSS-LISTING: POLI 4240.03, POLI 5240.03

PUAD 5130.03: Managerial Economics.

This class introduces the fundamental concepts of economics and helps to develop the analytical skills of students appropriate for practitioners in the public sector. It provides an understanding of basic microeconomic theories and principles in considerable depth, consistent with a graduate-level course in an interdisciplinary program. It is also concerned with the use and application of microeconomic theory and the relevance of this theory in economic decision making.
INSTRUCTOR(S): F. Siddiq/ M. Davies

PUAD 5131.03: Public Economics.

This class introduces the basic principles of public finance and macroeconomics, appropriate to a graduate-level course in an inter-disciplinary program. It is also concerned with the use and application of macroeconomic theory and the relevance of this theory in economic decision-making in a market economy with a large public sector. In particular, this class places a special emphasis on the role of government in the economy and on the application of economic theory in policy analysis within the framework of the Canadian federation. Together with Managerial Economics, these two courses provide a unique blend of theoretical rigour, empirical relevance and sound policy applications.
INSTRUCTOR(S): F. Siddiq/ M. Davies

PUAD 5140.03: Quantitative Methods.

This class is designed to enable students to understand existing statistical analyses, as well as to conduct their own. Statistical analyses are presented with focus on application in the public sector, emphasizing the importance of statistical analysis in social research and policy making. Specific topics include descriptive and inferential statistics, measures of association for nominal and ordinal variables, analysis of variance techniques, as well as linear regression. In addition to the class, students are also offered tutorials in working with SPSS and MS Excel. Student assignments require work with large data sets.
INSTRUCTOR(S): D. Wranik
CROSS-LISTING: LIBS 7390

PUAD 5150.03: Public Sector Accounting.

This class introduces students to the subject of accounting in governmental, and private sector organizations. A "user" approach is taken, but the class is presented from the standpoints of both users and authors of financial reports. No previous background in accounting is required but the class is challenging and provides a knowledge of the

essential elements of accounting for professionals in the field of public administration. For information about assignments and other class requirements please consult the instructor.
INSTRUCTOR(S): Staff

PUAD 5170.03: Public Sector Human Resources.

A major part of most public administration positions is human resource management. Therefore, it is important that public administrators understand the components of human resource management and their effect on an organization. In this class, human resource management is defined in a very broad sense, touching on all the major components of human resource management in order to give an overall concept or paradigm. The components are: 1) planning the need for public servants, 2) attracting the right people to be public servants, 3) placing the public servants in well matched jobs, 4) assisting public servants with their career development, 5) maintaining high performance with public servants and 6) evaluating public servants.
INSTRUCTOR(S): M. Cassin

PUAD 5180.03: Research Methods and Policy Analysis.

This class is designed to equip students with tools needed for the collection of quantitative and qualitative data. Students learn how to combine qualitative analysis with quantitative techniques they acquired in PUAD 5140. Specifically, students learn to write literature reviews, to conduct personal interviews, to run focus groups, and to design survey questionnaires. All techniques discussed are applied to the analysis of public policy issues. Policy is analyzed with respect to its strengths and weaknesses from various stakeholders perspectives. Students are required to present their work in class.
INSTRUCTOR(S): D. Wranik

Required Second Year Classes

PUAD 6000.03: Senior Seminar: Ethics, Public Service and Governance.

Designed as a culminating and integrating exercise for the MPA program, this class focuses upon a wide range of ethical problems in governance. Topics covered include conflict of interest, accountability, political neutrality, service to the public and codes of conduct.
The class is based on case studies with a premium placed on discussion. Please consult the instructor for information on assignments and other class requirements.
NOTE: For students enrolled in the two-year MPA program, successful completion of the first year of studies is the prerequisite for this class.
INSTRUCTOR(S): J. Roy

PUAD 6100.03: Modern Comptrollership.

This class will provide students with an opportunity to review the link between government budgeting, planning, programming and accountability. It will help students understand and connect what governments want to do with what they raise and spend money for. The course will progress from government revenue, expenditure and debt management policies through government financial reporting and ultimately accountability. These issues will be discussed in the context of what has been referred to by the federal government as "Modern Comptrollership". Recent developments at the national, provincial and municipal levels will be used as reference material.
INSTRUCTOR(S): B. Hennebury

Public Policy Concentration Classes

PUAD 6010.03: Issues in Public Administration.

This course provides a solid grounding in the legal underpinnings, the governance framework, and the concepts surrounding union-management and employee relations in the public service. This knowledge will strengthen the capacity of public servants to perform effectively whether they are employees, managers or elected union officials. The course will examine in some detail the evolution of labor rights and labor relations in the federal public service, up to and including the implementation of the Public Service Labor Relations Act which has been implemented as part of the newly enacted Public Service Modernization Act. It will examine the roles and responsibilities of the various players within the legal framework which governs these relationships and explore the impact in the workplace of the various approaches to labor management including the movement towards a less litigious Alternative Dispute Resolution (ADR) process as an alternative to the rights based processes and how this can affect the workplace.
INSTRUCTOR(S): D. Tucker

PUAD 6235.03: Issues in Applied Economics.

This class addresses a selection of topics in applied economics that are of considerable significance for any economy. It is designed for those students who wish to develop the ability to (a) understand and interpret different economic programs and policies beyond the introductory level; and (b) help formulate and implement such policies. Topics covered will depend in part upon the interests of students but some will be based upon the following areas: poverty and inequality; taxation; inflation and unemployment; stabilization policies; public sector economics; international trade and the balance of payments; technological innovation and growth. Each student will be expected to specialize in a topic of his or her choice and prepare a major paper for presentation in class. There will also be short assignments and a final examination. Please see the instructor for additional information about class requirements.
INSTRUCTOR(S): F. Siddiq/ M. Davies

PUAD 6300.03: Alternative Program Delivery.

Alternative Methods in Program Delivery is a graduate and honors undergraduate level seminar which allows participants to conduct and present research on the increasing resort by governments at all levels to alternative methods of program delivery. Over the last decade and a half, governments around the world have moved from designing and delivering programs themselves to utilizing the private sector, both profit and non-profit, for this purpose. These alternative methods have taken the form of the privatization of crown assets, public-private partnerships to address a myriad of concerns (from the design and construction of bridges and highways to the management of laundry facilities in institutions for long term care), user fees and charges, contracting out, and the adoption of business-like practices in their own operations.

This class has two purposes. The first is to allow participants to explore methodologies for assessing the viability of alternative program delivery in particular fields, based on the best practices of the past decade. The second is to allow participants to explore critically the use or proposed use of alternative methods of program delivery in areas in which they have an interest. Each participant is expected to prepare a seminar paper of at least 5,000 words, to present their findings in class in a presentation not exceeding thirty minutes in length, and to respond to questions. In addition, participants are asked to prepare a critique of a paper by another participant, and to lead discussion on that paper.
INSTRUCTOR(S): P. Brown

PUAD 6400.03: Local Government.

There is a renewed interest in local government resulting from population migration to urban areas, the need to invest heavily in improved and greener infrastructure that can be used to satisfy local service needs, and a trend towards a more inclusive public involvement in urban issues. This course looks at how local governments fit into the public sector framework, how provincial / national legislation empowers and limits them, and their governance and management. Services offered, and issues faced, by local governments vary with size, population density and with central government legislation. Issues facing local governments, and the central governments who determine municipal responsibilities and revenue sources, are researched, presented and discussed. While the primary focus of the course is on local government in Canada, structures and practices used in other countries to address local government issues will be included. The class is conducted in a seminar style format (class size permitting)
INSTRUCTOR(S): Staff
FORMAT: Seminar

PUAD 6450.03: Economics of Health Policy.

This class focuses on health policy themes as they relate to the current situation in the Canadian health policy arena. Themes include population health determinants, health system types, physician remuneration methods, health care delivery models, health production, demand for health care, and health system efficiency. The class is conducted in seminar style format.
INSTRUCTOR(S): D. Wranik
FORMAT: Lecture and seminar
PREREQUISITE: PUAD 5130, PUAD 5131 or equivalent courses from any Economics Department

PUAD 6455.03: Microeconomics of Health.

This course emphasizes the importance of economic theory and analysis within micromanagement of health care systems. The heath care market is analyzed from three perspectives, patient behavior, provider behavior, and the behavior of the payer or insurance firm. Economic theory aids in the understanding of all sides of this market. Policy advice can be extracted with respect to demand side management in the form of patient cost sharing or information control; supply side management in the form of varying remuneration methods and regulation; and provision of insurance via different methods. In addition, students learn how Health Technologies Assessment (HTA) is conducted, and how it is used as evidence in policy decision making.
INSTRUCTOR(S): D. Wranik

PUAD 6500.03: Business and Government.

The focus of this course is twofold: first, how government and business influence one another and secondly, why collaboration is a growing reality enjoining public sector and private sector organizations and the implications for each sector and society as a whole. The course aims to understand the fundamental difference between the public interest and the private interest and how such differences are sorted out through contemporary governance systems. While the emphasis will be on the Canadian environment, a comparative perspective will also be used in light of many issues that are increasingly transnational in scope.
INSTRUCTOR(S): J. Roy
CROSS-LISTING: BUSI 6009.03

PUAD 6505.03: Interest Groups: Function and Management.

This class will attempt a systematic examination of the function and management of interest groups in Canada and, to a lesser extent, other western countries. It will begin by considering the functions such groups perform for their supporters on the one hand and, on the other, the role they play in 1) maintaining political systems; 2) securing and modifying public policy, and 3) implementing programs. It will explore the ways in which their structures and behavior patterns vary according to the resources of the groups themselves, the nature of their concerns and the demands of the political/bureaucratic systems in which they operate. An important feature of the class will be a discussion of the internal management of groups. This discussion will include a review of how membership is secured and retained and how group resources are obtained and applied; the role of professional staff in developing group positions and in interacting between the interest group and government officials. In conclusion, the class will examine the role of interest groups in policy processes and the relationship between that role and the prospects for democracy in western politics. Approved with Canadian Studies.
INSTRUCTOR(S): L. Turnbull
CROSS-LISTING: POLI 3228.03, POLI 5228.03

PUAD 6525.06: Practicum in Policy Analysis and Management.

The Practicum provides MPA students with an opportunity in their final academic term to gain experience in the implementation and management of public sector consultation and research. It establishes a consultative context in which students can successfully implement a pro bono economic, financial or policy analysis or program evaluation project. The Practicum research groups will meet weekly to discuss applied research strategies for data collection, analysis and reporting. Topics and professional resources will be organized around the research needs of the projects and may include measurement and design, sampling, questionnaire design, cost-benefit analysis, computer applications for information management and analysis, report writing and presentation.

Materials will consist primarily of the professional literature and project content brought to the Practicum by the participating students. The professional literature from the first-term classes (e.g., Modern Comptrollership, Program Evaluation, Issues in Applied Economics) is brought into the Practicum as required. The Practicum is a full-credit elective course in the winter term.
INSTRUCTOR(S): F. Siddiq

PUAD 6537.03: Environmental Policy.

Issues in Environmental Policy is a graduate level seminar course designed to allow students to undertake an in depth analysis of an environmental issue for which a policy response is desirable, and to present this analysis in a format that invites constructive criticism through discussion. In general terms, the class is concerned with what governments , industry and other institutions do and how they do it with respect to the environment. Class work is designed to equip students with a structured process of policy development that is, in principle, applicable in any policy situation. This entails an examination of the instruments of governance (regulatory, economic, voluntary and information) and the factors that govern their use. The importance of identifying stakeholders and evaluating the degree of success of the policy approaches taken will be discussed with respect to several environmental issues. Class participants will apply these concepts to an environmental issue of their choice. Each participant is expected to prepare a seminar paper of at least 5,000 words, to present their findings in a presentation to the class, and to respond to questions.
INSTRUCTOR(S): R. Haworth

PUAD 6545.03: Provincial and Municipal Economic Development.

The aim of this class is to provide an understanding of the elements of economic development as practiced by government officials in most parts of the world. Most of this activity takes place at the local or regional (province, state) level. Economic development, in this context, refers not to technical economics, but to the way in which government officials try to encourage business and job growth in their respective territories.

The class will touch on such topics as industrial attrition, incentives and subsidies, community economic development, industrial parks, technology development and job training. Experienced individuals from the North American Policy Group (NAPG), Business Development Information (BDI) and local development agencies will add their expertise to the class.
A seminar format will be used if it is appropriate for the number of students enrolled. Evaluation will be based on participation and on a major project.
INSTRUCTOR(S): Staff

PUAD 6555.03: Management of Information (E-Government) and Public Administration.

The main objectives are to understand that information technologies provide means for public administrators to obtain, analyze, disseminate and store information; to analyze the uses of new technologies; and to understand the opportunities and problems that information technologies present to public administrators on personal, organizational and international levels.

Each class addresses separate but related issues of managing information in the public sector. Some of the classes look at the history of information technology to place present day devices into perspective. The topics for other classes relate IT to smart communities, professional development, virtual offices, digital divide, management information and unethical behavior in public offices.
INSTRUCTOR(S): J. Roy

PUAD 6556.03: Management of Information (E-Government): International Experiences and Perspectives.

Public administration rhetoric often indicates that governments are re-inventing themselves by using information technology. What is happening around the world with E-government? Using Canada as reference, this class reviews the development of management of information as it affects performance management, democracy, the nation state, accountability, network growth, productivity and access. Each student will be required to analyze an international country, state or province and its progression to e-government and relate that progress to activities in governments around the world.
Some of the topics covered are:

- Introduction to E-Government
- Service to Citizens
- Administration of E-Government
- Social Exclusion in the Digital Age
- Learning and Information Technology
- Knowledge Networks
- Personal Information and Information Technology
- Collaborative Networks
- The Dark Side of IT

EVALUATION: Each student will be required to analyze a non-Canadian country, state or province and its progression to e-government and relate that progress to activities in governments around the world. Recommendations for improvement should also be made. Each student negotiates with the professor for an appropriate country. Two papers, class participation and a final presentation based on the two papers, will determine the student's grade.
INSTRUCTOR(S): Staff
CROSS-LISTING: ECMM 6026.03

PUAD 6570.03: Equity and Diversity in the Public Sector.

This is a theoretical course on inclusion, participation and inequality in public service employment and public service delivery. It explores representativeness as an ideology and the management practices and policy initiatives which arise from this notion. The course considers the questions: What is equality? Why do we want equality? What difference does it make to have equality oriented initiatives? What is equity and diversity? What results are being achieved? What are the underlying issues of inequality difference and inclusion as they relate to Canadian democracy and global issues of equality?
INSTRUCTOR(S): M. Cassin

Public Management Concentration Classes

PUAD 6520.03: Program Evaluation Seminar.

This class is focused on the construction of different types of evaluation frameworks for a set of government programs or initiatives. Students prepare a plan of how to evaluate their program of choice giving special attention to perspective taken and stakeholder interests, students identify relevant data sources, and data collection instruments and design a research framework that combines qualitative and Quantitative approaches. Specific research skills acquired in PUAD 5140 and PUAD 5180, are applied to a broader and large scale evaluation framework. In addition, students are exposed to competing approaches to program evaluation, as well as ethical issues within the discipline. Student presentations and class discussion are an integral part of the class.
INSTRUCTOR(S): D. Wranik
PREREQUISITE: B+ or higher grade in each of the following courses - PUAD 5140 and PUAD 5180

PUAD 6555.03: Management of Information (E-Government) and Public Administration.

The main objectives are to understand that information technologies provide means for public administrators to obtain, analyze, disseminate and store information; to analyze the uses of new technologies; and to understand the opportunities and problems that information technologies present to public administrators on personal, organizational and international levels.

Each class addresses separate but related issues of managing information in the public sector. Some of the classes look at the history of information technology to place present day devices into perspective. The topics for other classes relate IT to smart communities, professional development, virtual offices, digital divide, management information and unethical behavior in public offices.
INSTRUCTOR(S): J. Roy

PUAD 6556.03: Management of Information (E-Government): International Experiences and Perspectives.

Public administration rhetoric often indicates that governments are re-inventing themselves by using information technology. What is happening around the world with E-government? Using Canada as reference, this class reviews the development of management of information as it affects performance management, democracy, the nation state, accountability, network growth, productivity and access. Each student will be required to analyze an international country, state or province and its progression to e-government and relate that progress to activities in governments around the world.
Some of the topics covered are:

- Introduction to E-Government
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- Administration of E-Government
- Social Exclusion in the Digital Age
- Learning and Information Technology
- Knowledge Networks
- Personal Information and Information Technology
- Collaborative Networks
- The Dark Side of IT

EVALUATION: Each student will be required to analyze a non-Canadian country, state or province and its progression to e-government and relate that progress to activities in governments around the world. Recommendations for improvement should also be made. Each student negotiates with the professor for an appropriate country. Two papers, class participation and a final presentation based on the two papers, will determine the student's grade.
INSTRUCTOR(S):Staff
CROSS-LISTING: ECMM 6026.03

PUAD 6560.03: The Organizational Culture of Public Administration Institutions.

This class examines public organizations through the conceptual framework of organizational culture. Edgar Schein argues that the term culture "...should be reserved for the deeper level of basic assumptions and beliefs that are shared by members of an organization, that operate unconsciously, and that define in a basic 'taken for granted' fashion an organization's view of itself and its environment."

He suggests that there are three levels of culture: artifacts, values and assumptions. The artifacts are the most easily observed and include such things as an organization's physical space, and members' overt behaviors and language(s). Values include a person's assessment of what "ought" to be, and assumptions are values that have become so much a part of a person's every day functioning that they are rarely consciously thought about or discussed because there is such wide spread acceptance of the value among the organizational members. The assumptions and values together compose the organization's culture.

The class will be a seminar of readings and discussions on organizational culture. With the assistance of the instructor, students will choose an organization, enter that organization to gather data and write a major paper describing the organizations' values, assumptions, maturity and ability to change.
Students will be evaluated on the following activities:
1. Class participation and presentations
2. Final Project
3. Take Home Exam
INSTRUCTOR(S): Staff

PUAD 6620.03: Women, Men and Management.

This course explores gender relations and public sector policy and management nationally and internationally. Management and policy is theorized as gender neutral work. This course explores this theory thematically in the context of an inquiry into inclusion and the gender equality agenda. Policy topics focus around delivery of public services to the private, social and public economy and in particular to men, women and families. New mainstreaming technologies including women's budgets are explored for how they can influence public policy and management practice. Within current topics the course explores gendered ways of knowing, methods of investigation and management modes of getting things done.
INSTRUCTOR(S): M. Cassin

PUAD 6625.03: Special Topics in Human Resource Management.

This course explores current topics in human resource management and policy in the public sector. The topic emphasis varies with issues and trends in public service. The approach to human resources explores the relations of organizations, work and people in the public sector. The aim of the course is to examine topics, how they are known as well as methods of investigation and problem solving. To learn of current topics, please consult the professor.
INSTRUCTOR(S): M. Cassin

PUAD 6780.03: Comparative Development Administration.

Some analytical and normative issues of public administration in developing countries are examined including the scope of development administration as a sub-field of public administration; public sector organization and management including public services, public enterprises, decentralization and rural development, financial systems, human resources management, aspects of state economic management with Japanese and South Korean case studies; and institutional aspects of aid administration with CIDA and World Bank cases.
INSTRUCTOR(S): P. Arthur
FORMAT: Seminar 2 hours
CROSS-LISTING: POLI 3302.03/5302.03

PUAD 6800.06/6820.06: Projects.

A class designated "project" and using this class number can be developed around an area of interest that is sufficiently complex to justify a full class credit. Such a project will likely be grounded in the needs of a particular agency and an area of professional literature that represents current debate or issues in the field of public administration. It may reflect on interest held by a student, faculty member or by a government agency.

PUAD 6855.03: Internship.

The Internship integrates professional development, work experience and academic studies. It involves developing job search and interview skills for the public sector, a competitively awarded work term and evaluation. The work term has appropriate public sector management and policy work and is sponsored by public sector employers. It is normally paid. The Internship is normally a summer internship between first and second year of the program. It is open to all students who have completed the first year. More information on the Internship is available on the SPA website.
COORDINATOR: M. Cassin
NOTE: This course has an administrative fee in addition to the course tuition. Please consult the SPA for details.

PUAD 6900.06/ 6910.03/ 6920.03/ 6944.06/ 6940.03/ 6942.03: Directed Reading.

A special program of directed reading, with appropriate written assignments, may be arranged with a faculty member where the interest in a subject is not sufficiently widespread to warrant offering a regular class. Students who wish to take any of the Project or Directed Reading Classes mentioned above must provide the School with the following before approval is granted:
1) a letter from the Professor* concerned indicating his/her willingness to supervise 2) a class outline which includes a description of the goals and objectives of the class, the grading scheme, a preliminary reading list and a schedule of the work; 3) the period in which the class is to be completed.
Not all classes are offered each year. Consult the School for current year offerings. In addition to the above, classes may be selected from other schools, departments, or faculties, subject to the approval of the Graduate Co-ordinator.
NOTE: Approval must be obtained from the Graduate Coordinator before the class begins.

PUAD 6925.03: Management Information Systems.

This class is meant to provide the student with a basic knowledge of information systems and their role in business organizations. Fundamental to this basic knowledge is an understanding of the variety of information systems in business. An understanding of the use of computers in current and future information systems is stressed.
CROSS-LISTING: BUSI 5511.03

MPA (Management) Classes

These classes are intended for students registered in the MPA (Management) program. For more information on this program please contact the Centre for Advanced Management Education - (902) 494-6391, Email: cfame@dal.ca.

MGMT 5105.03: Government Structure and Organization.

This class focuses on the Canadian system of government and addresses basic organizational theory and design as well as fundamental issues of public management.

MGMT 5110.03: Strategic Management in the Public Sector.

This class explores the concepts, potential and dynamics of strategic management in modern public administration. A wide variety of management instruments and techniques are analyzed.

MGMT 5125.03: Policy Formulation & Analysis.

This class covers the techniques, theory and contextual underpinnings central to effective policy management. The class explores strategic approaches to policy design and the role of the policy analyst in modern government.

MGMT 5135.03: Managerial Economics.

This class elucidates basic microeconomic theories and principles and applies these to economic decision making. The class increases understanding of the relationship between economic theory and economic policy.

MGMT 5140.03: Public Economics.

Introduces the basic principles of public finance and macroeconomics. The role of risk analysis in public sector decision-making is also explored. The class places a special emphasis on the role of government in the economy and on the application of economic theory in public policy analysis within the framework of the Canadian federation.
PREREQUISITE: MGMT 5135.03

MGMT 5146.03: Research Methods.

This class provides a practical setting for understanding the purchase, management and evaluation of research products. Applied research methods, research services and best practices are discussed in depth.

MGMT 5155.03: Financial and Managerial Accounting.

This class reviews each of the forms of accounting and financial data that public sector managers will be faced with now – and in the future. The essential concepts of financial and managerial accounting are comprehensively reviewed.

MGMT 5160.03: Public-Sector Financial Administration and Accountability.

This class focuses on the public policy and management issues of governance. It emphasizes development of the skills necessary to assess financial management approaches, develop business plans and implement performance measurement.

MGMT 6501.03: Business and Government.

This class presents the relationship between government and business in North America. It offers a practical approach to understanding the differences in how government and business operate, highlighting the techniques used by each side to influence the other.

MGMT 6525.03: Program Evaluation.

This class examines the theory, methods and issues of this growing field. The class emphasizes the skills necessary to assess feasibility of a program evaluation and to design it. Topics also include underlying values, alternative approaches, and implementation and utilization.

MGMT 6555.03: Managing the Information Resource.

This class examines the complex technological changes affecting public administrators. It provides broad-based information about the technological advances underway in Canada and fosters understanding of the opportunities and problems these changes present.

MGMT 6650.03: Human Resource Management.

This class explores the evolving practices and challenges faced by organizations seeking to excel in human resources – an essential determinant of organizational success.

MGMT 6700.03: Managing People in Diverse Organizations.

This class explores how managers can deal effectively with human problems in their organizations. Topics include motivation, leadership, communications perception and group dynamics.

MGMT 6755.03: Intergovernmental Relations in Canada.

This class focuses on a wide array of policy areas and uses case studies to demonstrate how intergovernmental issues - such as fiscal federalism and coordination of service delivery - are successfully resolved.

Social Work

Location: 6414 Coburg Road
Halifax, NS B3H 2A7
Telephone: (902) 494-3760
Fax: (902) 494-6709
Email: social.work@dal.ca
Website: http://www.dal.ca/socialwork

Director of the School

Thomas Bernard, Wanda

Graduate Coordinator

Richard, Brenda K.

Professors

Divine, D., BSc (Edinburgh), MSc (Aston), Dip SW (Moray), MSc Dip Housing (London School of Economics)
Thomas-Bernard, W., BA (MSVU), MSW (Dal), PhD (Sheffield)
Ungar, M., BA, BSW, MSW (McGill), PhD (Wilfrid Laurier)
Wien, F.C., BA (Queen's), MA, PhD (Cornell)

Associate Professors

Harbison, J., BA, Bsoc Stud (Dublin Trinity Coll), Grad Dip SW (Edinburgh), PhD (Toronto)
Karabanow, J., BA(Hons), MA (McGill), PhD (Wilfrid Laurier)
MacDonald, J., BSW (STU), MSW (Carleton U), PhD (MUN)
Richard, B.K., (MtA), MSW (Dal)

Assistant Professors

Baikie, G., BSW, MSW, PhD (MUN), PhD candidate
Brown, C., BA, MA (Manitoba), MSW (Carleton), PhD (Uof T)
Brown, M., BA Hon, BSW, MSW (Dal), PhD Candidate (MUN)
Campbell, C., BSc(King's), Bed. SpeEd (Acadia), MSW (Carleton), PhD (MUN)
Donovan, K., BSW (U of Regina), MSW (Carleton), MA (U of Lancaster, PhD Candidate
Hiranandani, V., BComm (U of Bombay), MSW (Tata Institute), MPhil (Tata Institute), PhD (U of Pennsylvania)
MacDonald, N., BA, BSW, MSW (Dal)
Weinberg, M., BA (U of Toronto), MSW (Smith College), PhD (U of Toronto)

Lecturer

Fay, J., BA (New Hampshire), MSW (Dal)

I. School of Social Work

The School of Social Work's vision is a commitment to building a socially just society, defined as one that upholds and validates the values of equality, diversity, inclusiveness, democracy and concern for human welfare. We manifest and advance curricula, scholarship and school culture that are congruent with those values. The School was founded in 1941 to meet a need for professionally qualified social workers in the Atlantic region. The School amalgamated with Dalhousie University in 1969 to become one of the nine constituents of the Faculty of Health Professions.

II. Master of Social Work (MSW) Degree

The Master of Social Work degree program is offered on campus and online through distance delivery. It provides students with advanced professional education leading to the development of specialized social work practice and leadership positions in the practice field.

Opportunity for in-depth learning is provided both in the course content and in the field placement. The student's ability to critically assess the nature and utility of interventions is developed in relation to social work values, including social justice. Elective courses enable the student to focus on areas of special interest.

Please consult our website (www.socialwork.dal.ca) for updates to our MSW Degree program.

In order to practice social work in Nova Scotia, all persons must have a social work degree (BSW or MSW) AND be approved for practice by the Board of Examiners of the Nova Scotia Association of Social Workers. Persons applying to the Board to practice social work should contact the address below for further information:

The Registrar of the Board of Examiners
Nova Scotia Association of Social Workers
1891 Brunswick St., Suite 106
Halifax, NS B3J 2G8
Telephone: (902) 429-7298

A. Program Objectives

The School of Social Work adheres to the principles of adult learning in its educational approach. This has special application for students of relative maturity with previous or concurrent professional social work experience. In the course of their study, MSW students are encouraged to identify and pursue their learning goals within the parameters of the curriculum and the objectives of the program, which include the following:

- Development of an understanding of the methods for critical appraisal and systematic inquiry related to existing practice theories, models of intervention and personal practice experiences and abilities;
- Application of these means to existing and new knowledge regarding practice contexts, practice-related issues, practice theories, models of intervention and personal practice experience and abilities;
- Acquisition of new knowledge with respect to practice contexts, theories and interventions, including an area of practice of particular interest to the student;
- Integration of the new knowledge acquired into practice situations which support the development of personal and social change.
- An anti-oppressive approach to social work.

B. The Specializations

Two areas of specialization for the development of practice are offered:

1. Individual and Family Practice, in either of two concentrations:
   - Physical and Mental Health or
   - Family and Child
2. Community Practice

1. Individual and Family (on-campus and online through distance delivery)

This specialization increases the student's ability to evaluate the efficacy and benefits of social work interventions by considering legislation, policies, and service delivery issues in relation to theories and models of practice interventions. It offers opportunities for students to apply this knowledge in field practice situations.

In the Family and Child concentration, the focus is on the family as a social entity and on child welfare. There is an emphasis on social analysis and policy.

In the Physical and Mental Health concentration, the focus is on theory, knowledge, and issues as they relate to social work practice in the areas of adult health and mental health.

2. Community Practice (on-campus only)

The Community specialization invites students to investigate and evaluate community action and community social work in relation to social movements and social work values through addressing both theoretical and practical concerns. It also examines how social work practice is shaped by the inter-relationships of place, class, race, ethnicity, gender, sexual orientation and disability in diverse communities. It offers opportunities for students to apply their knowledge in field practice situations.

III. Admission Requirements

All applicants must satisfy the admissions requirements of the Faculty of Graduate Studies, Dalhousie University as stated in this calendar. These include an undergraduate BSW degree from an accredited university with no less than a "B" level average. Applicants from outside Canada whose first language is not English must submit a Test of English as a Foreign Language (TOEFL) prior to the application deadline of December 1st, with a minimum acceptable score of 580, 237 computer version. Where TOEFL is unavailable, the following tests will be accepted with the following minimum scores: MELAB, 90; IELTS, 7. See Faculty of Graduate Studies Admission Requirements.

A. Canadian Residency Requirement for Distance Study

The on-line (distance delivery) option is only available to residents of Canada as defined by Canada Customs and Revenue Agency. If you will be residing outside Canada, please check with Canada Customs to determine your residency status, complete the Residency Form and submit it with your application package.

B. MSW Degree One Year Program (Campus, Distance Delivery)

The MSW program of advanced study in the theory and practice of Social Work is intended for persons with a baccalaureate degree in Social Work and normally at least two years of social work experience.

Prerequisites for the one-year MSW degree program include:

- A baccalaureate degree in Social Work;
- A cumulative academic GPA of 3.00 (on a 4.30 scale), or an equivalent cumulative average of at least B;
- Preferably two years of full-time employment in a social work position, following the BSW degree (see also Selection Criteria below);
- Personal suitability for the study and practice of social work.

C. MSW Degree Two Year Program (Campus Only)

Applicants who do not have a BSW degree but hold a master's degree in a closely related discipline and who meet the above pre-requisites, may be admitted to the first year of a two-year MSW program. During the first year, they need to satisfactorily complete certain advanced undergraduate social work classes., at a minimum B average.

D. Special Student Status

Special student status is **not** available for enrollment in graduate classes in Social Work. Classes are normally restricted to students who have applied and been accepted to the MSW degree programs, however, non-social work students may be permitted to register for MSW social work electives with permission of the instructor.

E. Distance Education

The Individual and Family specialization of the MSW Program is offered by distance delivery methods, on a part-time basis, to students throughout Canada. Students generally complete their program in a three year prescribed schedule.

F. Selection Criteria

The number of places offered each year to graduate students is limited. There are no deferrals granted in MSW Admissions. Applicants who do not register in the fall semester following acceptance, must re-apply. Candidates are selected according to their qualifications. The MSW Admissions Committee makes its selection on the basis of the following criteria:

- Academic performance, with particular reference to the Bachelor of Social Work degree; (last 20 half credits)
- Two years of full-time employment in a social work position following the BSW degree. Applicants who do not meet this criterion will be considered but they need to give evidence of: (a) A clearly defined field of practice related to social work; (b) A (professional) leadership role in their work or volunteer experience; (c) Maturity and intellectual capacity demonstrated in a thoughtful and reflective personal statement (Statement of Scholarly Interest); and (d) An understanding

of the complexity of the learning process, including a recognition of the limitation of their prior learning;
- Strength of academic, work, and professional references;
- Appropriateness of educational/professional goals to the School's class offerings;
- Personal suitability for social work.

G. Statement of Scholarly Interest

The Statement of Scholarly Interest is an important component of the MSW application. This statement explores a student's decision to pursue a graduate level degree in Social Work.

H. Personal Suitability

Aptitude and fitness for the profession of Social Work, as determined by the MSW Admissions Committee, is a requirement for admission as well as for continuation in the program. (See Section V: Required Withdrawal on Grounds of Unsuitability section.)

I. Affirmative Action Policy

In accordance with Human Rights legislation, the School of Social Work has an affirmative action policy for applicants who are Acadian, Aboriginal, Black/African Canadian, members of other racially visible groups, and for persons with disabilities. The School is committed to admitting and graduating the highest possible number of students who qualify under this policy.

The admissions prerequisites described in the above section are similar for all applicants. Each candidate who applies under the affirmative action policy is, however, considered on the basis of her/his qualifications for graduate study in Social Work rather than in relation to other candidates.

J. Application Procedure

Applications for admission are reviewed once a year following the application deadline date of December 1st.

MSW application packages include instructions, application, application fee, the three required reference forms, work/volunteer experience summary sheets, and guidelines for the Statement of Scholarly Interest. The cover sheet for the latter includes a place for eligible candidates to indicate whether they wish to apply under the Affirmative Action policy. MSW application packages are available on request from the Dalhousie University Registrar's Office and may be found on the School's Website: www.socialwork.dal.ca.

Incomplete and late applications cannot be considered. Each applicant is notified by mail of the MSW Admission Committee's final recommendation to the Dean of Graduate Studies. Acceptances are conditional on the approval of the Dean followed by official notification from the University Registrar.

K. Scholarships, Bursaries, Teaching Assistantships and Financial Aid

For information on prizes, bursaries, scholarships and loans available to graduate students, consult the relevant section of this graduate calendar, or go to www.socialwork.dal.ca.

IV. Curriculum Requirements–Masters of Social Work Degree Program

A. MSW Program

The MSW Program requirements consist of either

a. a course based option: 10 half-credit (0.5) Social Work core courses
b. a thesis option: 8 half-credit (0.5) Social Work courses, a one-credit (1.0) thesis

As described in section II Master of Social Work (MSW) Degree, there are two areas of specialization Individual and Family Practice (with a concentration in either Physical and Mental Health or Family and Child Welfare) and Community Practice. Core classes apply specifically to the specialization and concentration area that the student has applied for. Elective and thesis options will vary.

One-Year MSW (Campus and Distance Delivery)

The one-year MSW is available on a full-time or part-time basis to students studying on campus. The one-year MSW is available on a part-time basis to students studying via distance delivery. Qualified BSW graduates are admitted directly to the five-credit (30 credit hour) One-Year MSW program. These curriculum requirements cannot be reduced by advanced placement or transfer credit in relation to any graduate classes taken prior to MSW registration.

Distance students admitted to the One-Year MSW program and campus students who choose to complete their MSW program on a part-time basis would normally complete the course requirements over a three-year period.

Two-Year MSW (Campus Only)

Qualified students with previous master's degrees undertake the "One-Year" MSW curriculum requirements following successful completion of the five BSW credits (30 credit hours), at a minimum B average with which they begin their program of study. These five courses are determined by the Graduate Coordinator, School of Social Work. Students in the two year MSW program are required to complete two field education courses. In the first year the Field Education Course will comprise 200 to 400 hours depending upon the assessment of prior learning and experience. In the second year the Field Education Course comprises 450 hours.

Class Sequencing for Full-Time Students

The core classes (including Field) are offered during specific times in each term. Electives may be taken during the fall, winter or summer terms.

Full-time students who take a course-based program (non-thesis) may expect to complete the program by July of the following year and to graduate in October. Full-time student who elect to do a thesis should expect to spend eight to twelve months more for completion.

Class Sequencing for Part-Time Students

To maintain the integrity of the part-time student's academic program, core classes are taken in a prescribed sequence. The elective classes may be taken concurrently with the core classes in any year.

Part-time students who take a course-based option (non-thesis) may expect to spend three years to complete the program, graduating in May or October. Part-time students who elect to do a thesis should expect to spend an additional twelve to eighteen months for completion.

* Continuation as a "Thesis Only" student, for both full-time and part-time students, requires continuous registration and payment of continuation fees every term until all requirements are complete.

* It is important for prospective part-time students to note that most of the MSW core classes and the requisite agency field placement are available during daytime hours only.

Field Education

Students should note that the 0.5 credit field education course includes a field seminar and a field placement of 450 hours in an appropriate agency normally other than the student's place of employment. The Field education course is undertaken between January and end of June (on-campus) and between September and April (distance) concurrently with a bi-weekly field education seminar, which is online for distance students. The MSW Field Manual (which can be found at www.socialwork.dal.ca) contains the policy and procedures which define various aspects of the Field Education Course.

Confirmation of field placements requires advanced planning as there is considerable coordination required for each student placement.

Electives

Students completing their MSW program on both a full-time and part-time basis may take their electives either concurrently with or following the completion of the core courses Anti-Oppressive and Integrated Approaches to Social Work.

Any electives taken outside the School (i.e. a graduate class at Dalhousie University or another university, requires approval and "CUGTA" form). At least one elective must be taken in the School of Social Work.

Registration in elective courses is subject to availability.

B. Course Requirements

Students register for the core classes that apply to the specialization and concentration to which they have been accepted:

Individual and Family Practice Specialization

- SLWK 6001.03: Theory and Practice of Anti-Oppressive Social Work (0.5 credit)
- SLWK 6400.03: Integrated Approaches to Practice - Family & Child (0.5 credit) OR SLWK6410.03: Integrated Approaches to Practice - Health (0.5 credit)
- SLWK 6341.03: Critical Perspectives on Social Work Practice Interventions (0.5 credit)
- SLWK 6415.03: Field Work - (450 hours)(0.5 credit)
- SLWK 6333.03: Social Work Practice Research (0.5 credit)
- SLWK 6351.03: Research Proposal Seminar Class (0.5 credit)
- Two (2.0) credits of Elective classes with the classes only MSW degree option OR
- One (1) credit of Elective classes with the Thesis SLWK 9000 (0 credit) option.

Community Practice Specialization

- SLWK 6001.03: Theory and Practice of Anti-Oppressive Social Work
- SLWK 6333.03: Social Work Practice Research (0.5 credit)
- SLWK 6351.03: Research Proposal Seminar Class (0.5 credit)
- SLWK 6381.03: Social Policy Issues & Analysis for Social Work Practice (0.5 credit)
- SLWK 6420.03: Integrated Approaches to Practice - Community (0.5 credit)
- SLWK 6415.03: Field Work - (450 hours)(0.5 credit)
- Two (2.0) credits of Elective classes with the classes only MSW degree option OR
- One (1.0) credits of Elective classes with the Thesis SLWK 9000 (0 credit) option.

V. Regulations

All students are required to be familiar with and to observe University, Faculty of Graduate Studies and School of Social Work regulations. Students should therefore request a Graduate calendar when they register.

Please refer to Faculty of Graduate Studies Section IV. Registrations Procedures and Regulations on page 22.

A. Grading Requirements

Students are governed by the grading regulations of the Faculty of Graduate Studies.

B. Required Academic Withdrawal

A student who fails to meet the minimum grade requirement of "B-" in a class may be withdrawn from the MSW program. Students who are withdrawn may submit a formal written request to be re-admitted.

If the student is re-admitted, the failed/ uncompleted course(s) must be repeated with a final grade of at least B-. If the failed/uncompleted course was an elective, it can be replaced with another elective.

C. Required Withdrawal on the Grounds of Unsuitability

The School acting through its Program Committee and its Director may require a student to withdraw if judged to be unsuitable in aptitude and fitness for the profession of Social Work. Because the nature of the study and practice of Social Work places clients in a position of special trust in relation to social workers and social work, certain impairments or some types of conduct unbecoming to a member of the social work profession may be grounds for dismissal, or suspension. Aptitude and fitness for the profession of Social Work, as determined by the MSW Program Committee, are requirements for continuation in the program.

The following list of examples illustrates the criteria used to assess the unsuitability in aptitude and fitness. This list should not be considered to exclude other such behaviours:

1. conviction of criminal activity (e.g. assault, sexual assault, fraud and drug trafficking).
2. persistent substance abuse (e.g. alcoholism, drug addiction, use of illegal drugs).
3. any medical condition which affects an individual's ability to perform as a social worker if that condition is chronic and/or recurring and affects judgments.
4. unethical behaviour (see Nova Scotia Association of Social Workers Code of Ethics, 1994).

The MSW Committee will consider the student's situation to determine whether he/she is fit for the study and practice of Social Work. The principles of confidentiality, natural justice and due process are observed in all Committee deliberations.

D. Sexual Harassment

The School is governed by the Sexual Harassment Policy and Procedures of Dalhousie University. For more information, see Graduate Calendar: Resources and Services - Sexual Harassment Office.

VI. Core Class Descriptions

SLWK 6001.03: Theory and Practice of Anti-Oppressive Social Work.

The principles of cross-cultural and ethnic-specific social work practice are now widely accepted in social work education, training and practice. The more recent challenge has been to develop anti-racist and anti-oppressive theory and practice. Racism and oppressive practices are in conflict with the "caring" notion of social work as a profession. Multiple forms of oppression frame everyone's life. Social work intervention either adds to oppression, condones it through non-action, or does something to ease or break oppression. The aim of this class is to unravel the underlying thread of multiple oppression, and the interaction of various sources and forms of oppression, and to develop practice strategies that seek to challenge and break oppression.

SLWK 6333.03: Social Work Practice Research.

An overview of qualitative and quantitative research techniques used in the assessment of social work practice. Methods such as feasibility assessments, observational strategies, interviews, questionnaires, and standardized scales are reviewed. The class also explores the philosophy of "doing research" as well as considerations of ethics.

SLWK 6341.03: Critical Perspectives on Social Work Practice Interventions (Core Course For Family & Health).

The class will provide students with an opportunity to examine, discuss, and debate historical and current social work theories and their application to social work methods of practice with specific populations who are served by social workers.

SLWK 6351.03: Research Proposal Seminar Class.

The class provides the students with an opportunity to build on an understanding of the research process acquired through the pre-requisite class "Social Work Practice Research" in order to develop a research proposal in an area of practice of interest to the student.

SLWK 6381.03: Social Policy Issues and Analysis for Practice (Core Course For Community).

This class provides students with theoretical interpretations of the current and projected status of the welfare state in advanced industrial societies, consideration of the economic political, social and demographic factors that lead to change in social policy and their implications for social work practice.

SLWK 6400.03: Integrated Approaches for Practice - Family and Child (Core Course For Family).

This class examines social policy and social work practice relevant to 'family' and the child within the family. Students are expected to analyze conceptions of the family in relation to perspectives of social class, racism, sexism, heterosexism, ageism, and disability.

SLWK 6410.03: Integrated Approaches for Practice in Health Systems (Core Course For Health).

The class is to enable participants to enhance their understanding and practice abilities in diverse social work practice roles within the context of the health system through involving them in an examination and critique of theories and knowledge about health and health service delivery systems.

SLWK 6415.03: SLWK Field Work Class.

Field work class includes a bi-weekly field seminar and a field experience component of 450 hours in an apropriate agency normally other than the student's place of employment. The field placement requires advance planning as there is a considerable time period required for coordination and approval.
FORMAT: Seminar

SLWK 6420.03: Integrated Approaches to Community Practice (Core Course For Community).

This class will focus on critically interrogating what is meant by "community", "the state", "citizenship", "oppression", and "social justice". Time will be spent examining these trends at the theoretical level and in interpreting their application to community practice.

SLWK 9000.00: Master's Thesis.

The Thesis is a major research project undertaken independently but with guidance and supervision from your thesis committee. This option requires that students extend their time in the Program by at least 6 months full-time and eighteen months part-time.

VII.Elective Class Descriptions

SLWK 5110.03: Africentric Perspectives in Social Work.

The course provides students with an opportunity to engage in critical dialogue, reflection and action about historical and contemporary experiences of African Nova Scotians and Africans in the Diaspora. The course also focuses on awareness of Africentric theory, and its application in social work practice with Africans and non-Africans.
CROSS-LISTING: SLWK 3110.03

SLWK 5120.03: International Social Work.

This course introduces students to various 'worlds' of social work practice throughout the globe. Theoretical and practice grounding regarding development issues and social welfare systems within a global context is given. There will be encouragement to develop a critical and reflective stance toward the practice of social work in a global world.
FORMAT: Lecture, discussion

SLWK 5130.03: Critical Perspectives on Ageing and Practice.

The class examines the social construction of ageing and its relationship to the formation of gerontological knowledge. It explores the experiences of older people in both formal and informal service delivery systems and considers the extent to which the nature of and type of services offered, meet the needs of diverse groups of older people.
FORMAT: Lecture/Seminar/Discussion

SLWK 5160.03: Aboriginal Perspectives on Service Delivery and Practice.

SLWK 5380.03: (dis)Ability: Policy and Practice.

(dis)Ability will be examined from an anti-oppressive, social constructivist, rights-based lens, focusing primarily on three areas of exploration: (dis)Ability identity - how it is constructed, perceived and utilized within an albist world; societal location of (dis)Ability - examining the historical and current day (dis)placement of people with (dis)Abilities; and, policy/practice implications, ranging from grassroots (dis)Ability organizations to government legislation.

SLWK 5830.03: Independent Study.

A student may develop an Independent Study with a faculty supervisor on a subject of research interest to both. The student is responsible for following the School's Independent Study Guidelines which must be submitted for approval to the Graduate Coordinator by November 7 for courses proposed for the winter term, and by February 20th for courses proposed for the spring/summer term and the succeeding fall term. Written assignments are required.

SLWK 6363.03: Postmodern and Narrative Social work Practice

Rooted in social constructionism and post-modernism, narrative therapy emphasizes the idea w live stored lives. This course will integrate the theory and process of narrative practice through externalizing unhelpful stories and re-authoring preferred stories. Small groups will create and work with a case story adapted from film.

SLWK 6365.03: Community Socio-Economic Development.

This class deals with the socio-economic development of communities and regions that are economically disadvantaged, as measured by high rates of poverty and underemployment. This class includes an examination of the leading theoretical frameworks that seek to explain high rates of poverty and underemployment, the policy-strategy directions that flow from each of these frameworks, and current attempts to achieve socio-economic development, including the work of community practitioners. The applied aspect of the class will involve in-class seminars with resource persons as well as field trips to selected community development projects in the province, including Mi'kmaq and African Scotian locations.

SLWK 6370.03: Advanced Practice Skills.

This elective class is designed to put into practice the knowledge and skills students are developing in their field placements and work environments. Much of the learning is experiential. Students will be encouraged to think critically about the assumptions that underpin various approaches to practice. They will be given the opportunity to apply newly acquired knowledge and skills in a supportive environment, and to receive constructive feedback. Students are encouraged to develop a model of practice. Because this is a skills directed class, theory will be discussed within the context of practice. For example, if a particular practice approach derived from theory is being discussed, there will also be an opportunity to demonstrate that approach or technique via a role play or some other experiential method.

SLWK 6385.03: Community and Social Change Analysis.

There are tensions within the concept of "community" between marginalization and/or self-determination. Through case studies, the class explores these tensions as they occur in the field of community "care", an expanding field of social work practice. The theoretical base for the class draws on a variety of perspectives such as communitarianism, eco-feminism, social ecology, managerialism, neo-liberalism, and "new" social movement theory.
The core classes for community students, SLWK 6380.03 and 6385.03, may be taken as electives by Individual and Family students.

SLWK 6500.03: Interventions with Families.

The purpose of the class is to provide students with an awareness of issues in conceptualizing families and their diversity, and opportunities to develop knowledge about, examine, and critique a range of interventions with families and their application in social work practice situations.

SLWK 6510.03: Women, Social Policy and Social Citizenship.

The course examines the shifting terrain of women's social citizenship in Canada. An examination will be done of women's relationship to the Canadian welfare state, the nature of the new social policy regime and the impact that recent changes are having on women and gender equality.
FORMAT: Lecture, discussion

SLWK 6520.03: Current Issues and Trends in Social Work Supervision.

This course provides an opportunity to study the historical and current content of social work supervision. The relationship between social work theory and supervision methods will be examined from a critical perspective.

SLWK 6530.03: HIV/AIDS and Social Work Practice.

The course links social work practice to an examinationl of the biopsychosocial aspects of HIV/AIDS. Considering community and institutional responses to the epidemic, students will develop an understanding of the application of social work approaches and values to HIV/AIDS issues.
INSTRUCTOR(S): M. Petty
FORMAT: Seminar WebCT

Sociology and Social Anthropology

Location: 6135 University Ave.
Halifax, NS B3H 4P9
Telephone: (902) 494-6593
Fax: (902) 494-2897
Email: SOSAGrad@dal.ca

Chairperson of Department

Murphy, C.J.

Professors Emeriti

Clairmont, D.H., BA, MA (McMaster), PhD (Wash). Social Problems; Public Policy; Justice; Work; Ethno-cultural Relations

Thiessen, V., BA (Man), MA, PhD (Wis). Family Sociology; Sociology of Occupation; Youth Transitions; Social Psychology; Survey Research; Social Statistics; Education; Aspirations; School-to-Work; Coastal communities; Social Stratification

Professors

Apostle, R., BA (Simon Fraser), MA, PhD (Calif, Berkeley). Economic Sociology; Research Methodologies; Sociology of Culture

Barkow, J.H., AB (Brooklyn), AM, PhD (Chicago). Psychological Anthropology; Medical Anthropology; Evolutionary Psychology; West Africa; Human Nature

Binkley, M., BA, MA, PhD (Toronto). Maritime Anthropology; Coastal communities; Anthropology of Tourism; Women and Work; Qualitative and Quantitative Research Methods

Associate Professors

Butler, P.M., BA (MUN), MA (UNB), PhD (Toronto). Power; Public Opinion; Politics; Quantitative Methods; Public Opinion Polling; Canadian Society; Occupations; Telework

DuBois, L. BA (McGill), MA, PhD (New School-NY). History and Anthropology; Political Culture; Argentina; Latin America; Human Rights

Gardiner Barber, P., BA, MA (Auckland), PhD (Toronto). Culture and Political Economy; Development; Gender and Work; Globalization; Philippines; Transnationalism; Citizenship and Migration

Murphy, C.J., BA (StFX), MA (Dal), PhD (Toronto). Social Policy Research, Globalization, Policing and Security

Stolzman, J.D., BA (Ore), MS (Fla), PhD (Ore). Mental Health; Mental Disorders; Moral Panics; Sociological Pedagogy

Assistant Professors

Clark, P.G., BA, MA (McMaster), PhD (UBC). Theory Construction; Bodily Rituals; Pollution Taboos; Community Studies; Hutterian Society

Fitting, E., BA (U of Toronto), MA, PhD (New School). Rural development; Mexico; gender and ethnicity; commodity studies and globalization; agricultural biotechnology

Gambold, L., BA (U. of Illinois), MA, PhD (UCLA). Economic Anthropology; Kinship; Development; Rural Culture; Gender; Postsocialist Societies; Russia

Helland, C., BA, MA (Concordia), PhD (Toronto). Sociology of Religion, Communication and Information Technologies, Social Networks

Khasnabish, A., BA, MA, PhD. (McMaster). Culture, power and resistance; globalization, transnational activism, global justice, and social movements; democracy and political philosophy; political histories, political imagination, and activist narratives.

Martin, F., BA (Queens), MA, PhD (Melbourne). The Sociology of Addictions; The Sociology of Body and Emotions; Feminist Theory and the Sociology of Motherhood; Bioethics and Public Health; Forms and experiences of inequality inadvanced capitalist societies.

Noble, B., BA, MA, PhD (Alberta). Indigenous peoples, knowledge production, postcolonial relations, translocality, politics of transaction, anthropology of technoscience, public culture, museums and media

Oakley, R., BA (Hons) (SMU), MA, PhD (Toronto). Aging and the life course; Political economy of health and illness; development critique; South Africa

Park, M., BA (Toronto), MA (York), PhD (London School of Economics). Political Sociology, sociology of work, social movements, globalization, Asia

Ramos, H., BA (York), PhD (McGill). Political Sociology, Social Movements, Media Studies, Race/Ethnic/Minority Relations

Whelan, E., BA (Hons) (Winnipeg), MA (Queen's), PhD (Carleton). Sociology of knowledge; Sociology of Health and Illness; Gender; Science & Technology Studies

Cross-Appointed Professors

Beagan, B., BA (Dal), PhD (UBC). Major appointment in the School of Occupational Therapy. Social Inequality; Health and Illness; Gender & Health; Racism & Health; Health Professions

Cohen, F., BA, MEd (Harvard), PhD (Minn). Major appointment in the School for Resource & Evnironmental Studies. Native people and natural resources; fisheries co-management; education and training in environmental management

Cohen, M.M., BA (Mich), DMD (Tufts), MSD, PhD (Minn), MPH (Boston), FCCMG, Major appointment in Faculty of Dentistry. International Health

Graham, J., BA Hons (Waterloo), MA (Victoria), PhD (Montreal), Major appointment in the Department of Bioethics. Medical Anthropology; Science Studies; International harmonization of standards & regulations

Adjunct Professors

Davis, A., BA (SMU), MA (Manitoba), PhD (Toronto)

Gamberg, H.V., BA (Brandeis), MA, PhD (Princeton)

Looker, D., BA (Carleton), MA (Waterloo), PhD (McMaster)

Miller, V.P., BA (Calif, Berkeley), MA, PhD (Calif, Davis). Anthropology History and Theory; Ethnohistory; North America; Sociolinguistics

Morgan, J.G., BA (Nott), MA (McMaster), D Phil (Oxon)

Raymond, B., MA, MLS (Univ. Of California - Berkeley), MA (Manitoba), PhD (Chicago)

Thomson, A., BA, BEd, MA (Dal), PhD (Cambridge)

Research Associate

Phyne, J., BA (Memorial), MA, PhD (McMaster)

I. Admission Requirements

The Department of Sociology and Social Anthropology offers programs leading to the M.A. in Sociology, the M.A. in Social Anthropology, the PhD in Sociology, and Social Anthropology.

All candidates who are applying to the M.A. program in Sociology or Social Anthropology must satisfy the general requirements for admission to the Faculty of Graduate Studies. Candidates will normally be expected to hold a four-year degree in Sociology or Social Anthropology with at least an upper second class (A-) standing. It is expected that a candidate's undergraduate work will have included classes in theory and methods appropriate to the particular discipline. Promising applicants who fail to meet these requirements may be admitted to a qualifying year which, if successfully completed, would permit subsequent enrollment in the MA program.

All candidates who are applying for the PhD in Sociology or Social Anthropology must hold an M.A. in Sociology, Anthropology or its equivalent. Applicants must have a graduate academic record of at least A-. Priority for acceptance to the PhD program will be given to students whose areas of interest coincide with the Department's major areas of concentration. Priority in acceptance will also be given to students who have not acquired both a B.A. and M.A. from Dalhousie University, however, all applicants will be considered.

II. Degree Programs

A. Master of Arts (MA)

A full-time MA program is normally of one year's duration, its upper time limit (in accordance with Faculty of Graduate Studies regulations) being four years. A part-time option is also available, its upper time limit (once again, in accordance with Faculty of Graduate Studies regulations) being four years.

The normal program is made up of five full credits. A thesis (SOSA 9000.00, SOSA 9001.00), worth two credits, is required as are the following classes: Graduate Seminar (SOSA 5200.06) and Area Examination (SOSA 5300.06). An elective class (or two one-half credit classes) approved by the Graduate Education Committee constitute the final credit.

An examination in the student's chosen area of specialization as well as defense of a thesis proposal are required.

B. Doctor of Philosophy (PhD)

In accordance with the Faculty of Graduate Studies regulations, the program has a two-year residency requirement. It is expected that the program will take approximately four years to complete.

The student will also complete any additional graduate classes, internal or external to the Department, that the student's Advisory Committee deems necessary.

By the end of the second academic year the student must have written three interrelated comprehensive exams in theory, in methods and in a substantive area. The student is required to pass all three comprehensive exams in order to continue in the PhD program. During this year, or the following, the student is required to make a presentation to a departmental colloquium on a topic that normally will be related to the research proposal. The latter must also be completed and approved by the Advisory Committee by the end of the second year.

For the third (and any subsequent) years the student will register for "thesis only" credit. By the end of the third year, the student must demonstrate a working knowledge of a language other than English which is relevant to the student's studies and research. If a student does not have an approved doctoral thesis proposal within three calendar years after acceptance into the program, the student will not be permitted to continue in the program. In accordance with Faculty regulations, an oral defense of the thesis is required.

III. Class Descriptions

Classes may not be offered every year. Please consult the current timetable upon registration to determine if these classes are offered.

SOSA 5001.03: Quantitative Analysis for the Social Sciences I.

This class will introduce quantitative analysis. It will engage issues of research design, the relationship between samples and populations, statistics and inference, as well as basic tests of statistical significance. The course will also introduce tabular, graphical, and bi-variate linear analysis, using computer software. It will encourage secondary data analysis of available datasets, evaluation of surveys, and develop skills through a series of class projects.

FORMAT: Seminar

PREREQUISITE: SOSA 3402.03 and fourth year Major or Honors standing in Sociology and/or Social Anthropology

CROSS-LISTING: SOSA 4001.03

EXCLUSION: SOSA 3115.03

SOSA 5002.03: Quantitative Analysis for the Social Sciences II.

This course will focus on the use of quantitative methods in social science research. It will introduce students to regression techniques and concentrate on the assumptions motivating quantitative analysis. The course will also look at regression diagnostics and critically weigh options available to researchers when "normal" assumptions are broken. The class will be split into lectures and computer labs using statistical software. The labs will apply methods covered in class and explore potential secondary

data resources. The class will develop these skills through a series of class projects.
FORMAT: Seminar
CROSS-LISTING: SOSA 4002.03

SOSA 5003.03: Contemporary Perspectives in Ethnography.

Ethnographies and critical writings which grapple with questions of theory and interpretation in a range of contexts-near and far, familiar and strange, local and global - will be examined in this class.
FORMAT: Seminar

SOSA 5004.03: Advanced Issues in Economy, Work, and Development.

Each year, this "advanced issues" class focuses on a different specific topic within the general area. In past years topics have addressed the social and cultural aspects of changing livelihoods and patterns of work associated with globalization. The approach is typically comparative and considers different regional, national, and international contexts. Consult Department for the specific topic.

SOSA 5005.03: Advanced Issues in Social Justice and Inequality.

Each year, this "advanced issues" class focuses on a different specific topic within the general area. In past years topics have addressed social and moral problems of social inequalities of various kinds viewed in a context of global changes. Sample topics include but are not restricted to: gender, minority and class inequalities; struggles over rights; social movements; social scenarios surrounding citizenship, migration and immigration; multiculturalism; and border and security studies. Consult Department for specific topic.

SOSA 5006.03: Advanced Issues in Critical Health Studies.

Each year, this "advanced issues" class focuses on a different specific topic within the general area. In past years topics have addressed how health is socially and culturally constructed, the differential social and cultural effects of health knowledges and power relationships, and how various perspectives on health are challenged from within and beyond the health professions. Consult Department for the specific topic.

SOSA 5007.03: Tourism and Development.

Tourism is now the most lucrative industry in the world. Around the globe, companies chase the tourist's dollar offering the best deals on a wide range of destinations tailored to a variety of different experiences from sex tourism to eco-tourism. This class will explore the relationship between tourism and development. Topics under discussion will include the definitions of hosts and guests, the commodification of tourist sites and the tourist experience, and the relationship of tourism to sustainability, environmentalism, and globalization.
FORMAT: Seminar
CROSS-LISTING: SOSA 4210.03

SOSA 5011.03: Advanced Issues in Social Theory.

This seminar consists of an intensive examination of one or more selected bodies of theory , and makes links between theory and current trends in research in sociology and/or social anthropology.
FORMAT: Seminar

SOSA 5012.03: Special Topics in Sociology and Social Anthropology.

This seminar consists of an intensive examination of a selected substantive issue within Sociology and Anthropology. Since the specific topic or research problem which receives special treatment will differ from year to year, students are advised to consult the department prior to registration.
FORMAT: Seminar

SOSA 5031.03: Social Policy Research Seminar.

One of the distinctive features of the social sciences had been the use of social research as a basis for the development and reform of social policy. Though the relationship of social research to social policy has changed and evolved with changes in the politics and process of policy making, it still remains a core activity for many social scientists. Using a variety of academic and applied research sources, the seminar will examine the politics of policy research, uses of social research knowledge, policy research models and research strategies and the policy outcomes of social research. In addition to reviewing the critical literature on social policy research, students will do case study analysis of a major policy research project. The class will selectively draw on faculty, government and private sector policy researchers and policy makers to help ground discussion and research in actual policy research experience.
FORMAT: Seminar

SOSA 5060.03: Advanced Social Analysis.

This seminar begins with an exploration of the nature of arguments/theses/explanations. Included in this exploration is an examination of the criteria for relevant data/information used to assess such arguments/theses/explanations. Following this general introduction to the nature of social-scientific scholarship, the focus shifts to an overview of the main types of data collection designs used in sociology and social anthropology.
FORMAT: Seminar

SOSA 5072.03: Naturalistic Approaches to the Social Sciences.

This seminar explores the implications of a Darwinian perspective for the social sciences. The latter have long followed a species-centric, environmental-deterministic ideology that today requires reconciliation with the enormous advances in recent decades in research and theory that have occurred in evolutionary biology, psychology, ethology, behavioral ecology and primate behavior. Specific topics may include but will not be limited to biophobia, social/cultural constructionism, morality and ethics, religion, esthetics and literature, evolutionary approaches to feminist theory, and Darwinian approaches to social problems (including ethnocentricism, racism, sexism, and crime).
FORMAT: Seminar

SOSA 5200.06: Graduate Seminar.

This class is structured to assist students in a process of professional development, as well as to facilitate a student's general progress through the Master's program. The seminar will include formal presentations by each of its participants and will have as goals: (1) practice in giving and receiving criticism, (2) identifying the important literature in an area and critically assessing it, and (3) understanding the stages and purposes involved in an advanced research undertaking. The second part of the seminar will involve working towards producing a preliminary proposal for the Master's thesis.
FORMAT: Seminar

SOSA 5300.06: Area Examination.

The Area Examination is an examination in some designated area of Sociology or of Social Anthropology. The area itself is based on a reading list developed by the student's Program Committee in consultation with the student.

SOSA 5510.03: Graduate Readings in Sociology and Social Anthropology.

In a reading class, the student is assigned to a member or staff or regular meetings to discuss in a selected area. Papers and research projects are expected.
FORMAT: Individual instruction

SOSA 5520.03: Graduate Readings in Sociology and Social Anthropology.

In a reading class the student is assigned to a member or staff or regular meetings to discuss in a selected area. Papers and research projects are expected.
FORMAT: Individual instruction

SOSA 5530.06: International Development Studies Through the Shastri Summer Institute in India.

The placement would be for nine-ten weeks offered during the summer. Two weeks of briefing and debriefing both within Canada and India, with remaining weeks spent in the actual placement in India. This class is for

students who wish to earn academic credit related to their work in India. Students will be chosen on the basis of their academic standing as well as their strong interest in South Asia. Students will be accompanied overseas by a faculty member.

SOSA 5540.03: Community-Based Co-Management.
See class description for MARA 5012.03 in the Marine Affairs section of this calendar.

SOSA 9000.00: MA Thesis - SOCI.

SOSA 9001.00: MA Thesis - SOAN.

SOSA 9530.00: PhD Thesis.

Statistics

Location: Chase Building
Halifax, NS B3H 4H7
Telephone: (902) 494-2572
Fax: (902) 494-5130
Website: http://www.mathstat.dal.ca/~statdir

Chair of the Department
Dilcher, K., PhD (Queens)

Director of Division
Hamilton, D., PhD (Queens)

Graduate Coordinator
Susko, E.A., MSc (UBC), PhD (Waterloo)

Professor Emeritus
Field, C.A., MSc, PhD (Northwestern). Robust statistics, data analysis, bioinformatics.

Professors
Gabor, G., MSc, PhD (Eotvos). Statistical inference, information theory.
Hamilton, D., MA, PhD (Queens). Linear and nonlinear regression, data analysis, statistical genetics.
Smith, B., MSc (Calgary), PhD (Berkeley). Time series analysis, data analysis, statistical genetics.
Thompson, K., MSc (Manchester), PhD (Liverpool), joint appointment with Oceanography. Time series analysis, applications to oceanography.

Associate Professors
Gu, Hong, MSc (Peking), PhD (Hong Kong), Data mining, bioinformatics
Herbinger, C. MSc (Paris), PhD (Dal). Joint appointment with Biology, statistical genetics
Susko, E.A., MSc (UBC), PhD (Waterloo). Molecular evolution, bioinformatics, mixture models, machine learning, data analysis
Zhao, Y., MSc (Western Kentucky), PhD (British Columbia), joint appointment with Management

Assistant Professors
Beiko, R., PhD (Ottawa), joint appointment with Computer Science
Bielawski, J.P., MA (Hofstra), PhD (Texas A & M Univ), joint appointment with Biology. Adaptive molecular evolution, Markov models of molecular evolution, genomics, bioinformatics
Dowd, M., MBA, MES, PhD (Dalhousie). Statistical inverse problems, time series, spatical analysis, stochastic dynamic models
Flemming, J. (Mills), MSc (Tuns), PhD (Dal), Environmental statistics, robustness, animal movement models

Adjunct Professors
Astatke, T., PhD (Queen's), NS Agricultural College
Chipman, H., PhD (Waterloo), Acadia University
Cole, D.E.C., PhD (McGill), University of Toronto
Gupta, R.P., MSc (Agra), PhD (Delhi), Dalhousie University
Millar, M., MSc, PhD (Dalhousie), Mt. St. Vincent

Statistical Consultant
Grover, V., MSc (Delhi)

Please refer to the entry for the Department of Mathematics and Statistics in this calendar for a full listing of the members of the Department and information on other programs offered by the Department.

The department offers programs leading to the degrees of MSc and PhD in the following areas: statistical inference, robust statistics, data mining,

bioinformatics, data analysis, multivariate analysis, linear and nonlinear regression, time series analysis, statistical genetics, environmental statistics, information theory.

I. Admission Requirements

Candidates must satisfy the general requirements for admission to the Faculty of Graduate Studies.

Candidates will normally be expected to hold a degree recognised by Dalhousie University as the equivalent of a Bachelor's degree with Honours in one of its own faculties.

GRE Aptitude and Advanced Mathematics scores are recommended for all applicants for graduate studies whose undergraduate work has been completed outside of Canada, and TOEFL scores are required for applicants whose native language is not English. Valid score reports must be received directly from the Educational Testing Service. To ensure consideration for scholarship funds, application should be made by January 31.

II. Degree Programs

A. Master of Science (MSc)

Requirements

1. At least three full-credit classes, not including seminar classes or Statistical Consulting class, at the graduate level to be chosen in consultation with a department adviser. In addition, students whose preparation is deficient will be required to complete appropriate classes which will be designated by the adviser.
2. Attendance and participation in seminars.
3. A satisfactory thesis.
4. Students are required to give an oral presentation of their thesis and at that time to answer questions about the thesis. This presentation will be made after the thesis is in the hands of the student's committee and will be taken into account when the committee makes it's decision.
5. Fifty hours consulting or completion of Statistical Consulting class. This requirement will be waived for students who have completed a Statistical Consulting class.

B. Doctor of Philosophy (PhD)

Requirements

NOTE: The minimum and maximum time required to complete this program are set out in Section 1.3.2 and 6.1 in the Faculty of Graduate Studies regulations.

1. At least two full-credit classes.
2. Comprehensive examinations which are jointly written by all incoming PhD students, on a date specified by the Graduate Coordinator, in May of the year of admission.
3. Attendance and participation in an appropriate seminar.
4. Preparation and defence of a satisfactory research thesis.
5. Fifty hours consulting or completion of Statistical Consulting class. This requirement will be waived for students who have completed a Statistical Consulting class.

III. Class Descriptions

A selection of the following graduate classes will be offered subject to demand.

STAT 5066.03: Advanced Statistical Theory I.

This class, together with STAT 4066.03 provides a solid basis in the theory of statistical inference. After a review of some probability and distribution theory, the Bayesian and classical theories of estimation and testing are introduced.
CROSS-LISTING: MATH 4066.03/5066.03, STAT 4066.03

STAT 5067.03: Advanced Statistical Theory II.

This course builds upon the material of Statistics 4066/5066. After a discussion of shortcomings of classical theory, the basic inferential rules (leading to Bayesian inference) are introduced and consistently applied throughout the course to solve problems of inference.
CROSS-LISTING: MATH 5067.03

STAT 5070.03/4070.03: Multivariate Distributions.

This class deals with the distribution theory of the observations on more than one variable. Topics covered include: the multivariate normal distribution, the Wishart distribution, Hotelling's T, distributions associated with regression, canonical correlations and discriminant analysis.
FORMAT: Lecture 3 hours
PREREQUISITE: STAT 3460.03

STAT 5090.03/4090.03: Probability.

The theory of probability in Euclidean space. Topics include measure and integration, probability measures, the definitions and properties of random variables and distribution functions, convergence concepts, Borel-Cantelli lemmas, laws of large numbers, characteristic functions and central limit theorems, conditional probability and expectation.
FORMAT: Lecture 3 hours
PREREQUISITE: STAT 3360.03 and a third year analysis class, instructor's consent
CROSS-LISTING: MATH 4090.03/5090.03, STAT 4090.03

STAT 5100.03/4100.03: Survival Analysis.

This class is an introduction to survival analysis methods and will cover both the statistical theory behind the methods, and the application of various techniques. Topics to be discussed include survivorship and hazard functions and their relationship to lifetime distributions and densities; modes of censoring; the Kaplan-Meier estimate of the new survivor function; parametric survival time distributions; proportional hazard models and their semi-parametric estimation; accelerated life models, log rank tests, including the Mantel-Haenszel test; and goodness of fit measures.
FORMAT: Lecture 3 hours
PREREQUISITE: STAT 3340.03 and STAT 3460.03, or equivalent
CROSS-LISTING: STAT 4100.03

STAT 5300.03: Topics in Statistics and Probability.

STAT 5350.03/4350.03: Applied Multivariate Analysis.

This class deals with the stochastic behavior of several variables in systems where their interdependence is the object of analysis. Greater emphasis is placed on a practical application than on mathematical refinement. Topics include classification, cluster analysis, categorized data, analysis of interdependence, structural simplification by transformation or modelling and hypothesis construction and testing.
FORMAT: Lecture 3 hours
PREREQUISITE: STAT 3340.03 and MATH 2135.03 or 2040.03
CROSS-LISTING: STAT 4350.03

STAT 5360.03/4360.03: Robust Statistics.

Robust statistics are those which provide protection against violation of assumptions underlying the statistical procedure. We will develop basic concepts including sensitivity, influence and breakdown of estimates and tests. Classical procedures will be evaluated in terms of robustness and alternate techniques developed based on weighted least squares and/or median based generalizations. Starting from the location problem, we will move on to regression and to multivariate problems by means of robust covariance estimates. We will also consider robust techniques in time series. Some simple programming will be required to implement various procedures.
FORMAT: Lecture 3 hours
PREREQUISITE: STAT 3460.03 and 3340.03
CROSS-LISTING: STAT 4360.03

STAT 5370.03/4370.03: Stochastic Process.

The theory and application of stochastic processes. Topics to be discussed include the Poisson process, renewal theory, discrete and continuous time Markov processes, and Brownian motion. Applications will be taken from the biological and physical sciences, and queuing theory.
FORMAT: Lecture 3 hours
PREREQUISITE: STAT 3360.03 or instructor's consent
CROSS-LISTING: STAT 4370.03

STAT 5390.03/4390.03: Time Series Analysis I.

Time series analysis in both the time and frequency domain is introduced. The class is applied and students are required to develop their own computer programs in the analysis of time series drawn from real problems. Topics to be discussed include the nature of time series, stationarity, auto and cross covariance functions, the Box-Jenkins approach to model identification and fitting, power and cross spectra and the analysis of linear time-invariant relationships between pairs of series.
FORMAT: Lecture 3 hours
PREREQUISITE: STAT 3340.03, 3460.03, or instructor's consent
CROSS-LISTING: OCEA 4210.03/5210.03, STAT 4390.03

STAT 5410.03/4410.03: Advanced Topics in Time Series Analysis.

STAT 5500.03: Topics in Advanced Statistics.

STAT 5620.03/4620.03: Data Analysis.

A variety of statistical models which are useful for the analysis of real data are discussed. Topics may include: generalized linear models, such as logistic regression and Poisson regression, models for multidimensional contingency tables, ordered categories and survival data.
FORMAT: Lecture 3 hours
PREREQUISITE: STAT 3340.03, 3460.03, or instructor's consent
CROSS-LISTING: STAT 4620.03

STAT 5630.03: Statistical Methods in Molecular Evolution.

This class will cover the common data types, models, and estimation and inferential methods in Molecular Evolution. The non-standard nature of the data and parameter space make this an usual statistical problem. Topics include distance methods, maximum likelihood and confidence regions for trees.
PREREQUISITE: STAT 3460 or instructor's consent

STAT 5700X/Y.03: Statistical Consulting Practicum.

This class gives Statistics graduate students practical experience in Statistical Consulting. The class will address the issues of communications with the client, and the translation of their questions into statistical language. Students will carry out a minimum of 30 hours consulting.
NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

STAT 5990.03: Intermediate Statistics for Health Sciences.

This class is designed as a second class in statistics and is intended to provide the graduate student with a working knowledge of the statistical issues and techniques more commonly used by researchers in the Health Sciences. The focus is on setting up appropriate statistical models and on the interpretation of the results. Statistical packages, including MINITAB and GLIM, will be used to carry out the computations. The topics to be covered include: simple linear regression, correlation, analysis of variance (ANOVA), multiple regression, inference, qualitative variables, multicollinearity, sampling experimental design, analysis of covariance and repeated measure design.
NOTE: Not available for graduate students in Statistics.
FORMAT: Lecture 3 hours.

Centres and Institutes

A number of centres and institutes for study and research in specific fields are based at the University. These are:

Atlantic Health Promotion Research Centre

Managing Director: Sandra Crowell, MPA
Canada Research Chair: Renee Lyons, PHD
Other: Project Coordinators, Research Assistants, affiliated faculty and students
Tel: (902) 494-2240
Fax: (902) 494-3594
Website: www.ahprc.dal.ca

The Atlantic Health Promotion Research Centre (AHPRC) was established in May, 1993 through a Centres of Excellence grant from the Social Sciences and Humanities Research Council of Canada (SSHRC) and the National Health Research Development Program (NHRDP). Since 1993, the Centre has generated over $18 million in research grants and contracts.

The AHPRC is currently supported by the Faculties of Health Professions, Medicine, and Dentistry at Dalhousie University. Support for specific research projects comes from agencies such as Canadian Institutes for Health Research, Social Sciences and Humanities Research Council of Canada, Canadian Health Services Research Foundation, Nova Scotia Health Research Foundation and Health Canada.

Current research areas include health systems reform, knowledge translation, prevention of chronic illness and disability, settings and health and youth obesity.

AHPRC is the Atlantic representative in the Canadian Consortium for Health Promotion Research which includes university-based health research centres from across Canada.

Atlantic Institute of Criminology

Director: D.H. Clairmont, BA, MA, PhD

The Atlantic Institute of Criminology was established to provide a centre for research in the areas of criminology, policing, and other concerns of the justice system. Associate memberships are available to interested and qualified persons.

Atlantic Region Magnetic Resonance Centre

Director: J.W. Zwanziger, BA, MS, PhD
Coordinator: M.D. Lumsden, BSc, PhD
Other Staff: U. Werner-Zwanziger, BSc, PhD

Established in 1982 with assistance from the Natural Sciences and Engineering Research Council, the Centre is located in the Department of Chemistry and involves faculty, researchers and graduate students in all Maritime universities and many Dalhousie Departments. It is concerned with applications of magnetic resonance spectroscopy to problems in chemistry, materials science, biology, biochemistry, and related areas. Its current instrumentation includes Bruker AC-250 (Tecmag upgrade) and Avance-500 NMR spectrometers for liquids, Bruker Avance DSX 400 and Avance 700 NMR spectrometers for solids and a dual purpose solids/liquids Bruker AMX-400 NMR spectrometer. The Avance-500 and Avance-700 NMR spectrometers were installed in 2003 with funding from NSERC, the Canadian Foundation for Innovation and the Atlantic Innovation Fund. The current director, Professor J. Zwanziger, holds the Tier 1 Canada Research Chair in NMR Studies of Materials.

The Centre offers facilities for hands-on use by researchers and also provides NMR spectra and expertise to scientists throughout the Atlantic Region. It also interacts widely with Maritime industries.

For information see: www.armrc.chemistry.dal.ca

Atlantic Research Centre (ARC)

Director: Neale Ridgway
Phone: (902) 494-7133
Website: http://arc.medicine.dal.ca/

Established in 1967, the ARC conducts basic biomedical research in the fields of lipid metabolism and cell signalling, areas of fundamental importance to a variety of disorders including cancer, neurological, heart and infectious diseases. It also provides education and expertise in these fields to undergraduate and graduate students, other researchers, and the general public. The ARC houses state-of-the-art facilities for biochemical and molecular biological research, including a regional proteomics service facility (DalGEN, http://genomics.medicine.dal.ca/), and is affiliated with the IWK Cheminformatics & Drug Discovery Laboratory. The Centre's staff hold appointments in the Departments of Pediatrics and Biochemistry & Molecular Biology in the Faculty of Medicine. Research at the ARC is supported by agencies such as the CIHR, NSERC, CFI, Heart and Stroke Foundation, National Cancer Institute, Atlantic Innovation Fund, and the IWK Health Centre.

Brain Repair Centre

Chair: Dr. Ivar Mendez, (Professor and Head, Division of Neurosurgery, Department of Surgery and Cross-appointment in Department of Anatomy & Neurobiology, Faculty of Medicine)
Website: http://www.brainrepair.ca/

The Brain Repair Centre (BRC) is a joint research institute of Dalhousie University and the Capital District Health Authority. The BRC is a multi-disciplinary unit focusing on research that can lead to the treatment and repair of the brain to overcome the effects of neurological and psychiatric disorders such as Parkinson's disease, Alzheimer's disease, Huntington's disease, Amyotrophic Lateral Sclerosis (ALS), stroke and spinal cord injury. The BRC grew out of the clinical Neural Transplantation Program, collaboration between basic neuroscientists and clinicians interested in treating Parkinson's disease. The success of the Neural Transplantation Program led clinical and basic neuroscientists to decide to form the Brain Repair Centre. The BRC came together at a meeting held in the Halifax Infirmary in 1999 and decided to focus on stem cell neural transplantation and neuroimaging as areas of innovation at Dalhousie University, Capital Health and the IWK Health Centre.

Examples of developments that have contributed to BRC's research strengths and capabilities include:

- Establishment of a $12 million magnetic resonance imaging facility with the National Research Council's Institute for Biodiagnostics (NRC-IBD).
- In 2006, the BRC won a $5.5 million infrastructure grant from the Canadian Foundation for Innovation, the largest such award to date in Atlantic Canada. Also in 2006, BRC received a $3 million Atlantic Innovation Fund award for research, a follow-on to an earlier $3 million research award.
- In the neurotransplantation field, the BRC is unique in Canada and one of only four centres worldwide involved in clinical application of neural transplantation.
- The BRC is an innovative collaboration that integrates its research expertise with pioneers in the fields of imaging, neurology, stem cell neurobiology, vision, molecular neurobiology, pharmacology, psychiatry, clinical trials and cognitive neuroscience.
- The BRC brings together the expanding fields of neuroimaging and stem cell technologies with application to neural transplantation and the treatment of neurological and psychiatric disorders.
- The BRC is the Atlantic Canada presence in the Stem Cell Network, a National Centre of Excellence in stem cell research.

The Brain Repair Centre is playing a pivotal role in the development of a new research complex (the Life Sciences Research Institute or LSRI) to support the BRC and provide it an adjacent integrated, up-to-date animal care research facility. When the LSRI is completed, the Brain Repair Centre will become the anchor tenant of this new research and commercialization facility.

The BRC is pursuing a number of approaches to brain repair including neural transplantation, neuroimaging and neuroprotection. The BRC places emphasis on moving basic science research from the bench to the clinical bedside and from the bedside back to the bench. A key objective of the BRC is to produce innovative technologies that will be commercialized. To that end, BRC works in close collaboration with the University Industry Liaison & Innovation Office and other related entities.

Canadian Institute of Fisheries Technology (CIFT)

Director: T.A. Gill, PhD
Telephone: (902) 494-6030
Fax: (902) 420-0219
Website: www.dal.ca/cift.engineering.dal.ca

The Canadian Institute of Fisheries Technology was established in 1979 at the former Nova Scotia Technical College (later TUNS). The federal Department of Fisheries and Oceans provided much of its early specialized laboratory and seafood pilot scale processing equipment, and Industry Canada provided start-up funding and designated CIFT a centre of excellence. As a government-approved laboratory for advanced technology, it also provides R&D services on a cost-recovery basis to industry and to various governmental agencies. The Institute promotes technology transfer and the development of advanced technologies aimed at more effective commercial utilization of fish supplies in Canada and throughout the world.

In addition, the CIFT offers unique opportunities for undergraduate, graduate and doctoral training and research through the Food Science program. Major areas of emphasis are: food biochemistry and microbiology; fats, oils and nutraceuticals; physical properties of foods; fish/food process engineering; computerized control in the food processing industry; food safety and preservation; food rheology, food fermentation and beverage science.

Facilities

The Canadian Institute of Fisheries Technology is located in the MacDonald building of Sexton Campus at 1360 Barrington Street in downtown Halifax. The Institute's facilities include:

- fats and oils laboratory
- seafood chemistry laboratory
- food development laboratory
- sensory evaluation laboratory
- food process engineering pilot plant
- low temperature storage facility
- food physical properties laboratory
- food microbiology laboratory

These areas contain specialized instruments and food processing equipment to enable experimental processing, laboratory analysis, and product storage evaluation. In addition to a computer- controlled cold-storage facility, the pilot plant is equipped for experimental processing including freezing, chilling, thermal processing, drying and smoking, centrifugal separation, meat-bone separation and modified atmosphere storage.

The pilot plant is especially well equipped for thermal processing with a modern automated retort capable of steam, steam-air, or water immersion processing research. The specially designed cold-storage facility is computer controlled and particularly useful for the study of changes in foods as a result of frozen storage history. The pilot plant is also equipped with a custom-built computer-controlled heat pump dryer that is used in food dehydration experiments.

Specialized laboratory equipment includes: automated high performance and fast protein liquid chromatography systems, gas chromatography/ mass spectroscopy system, preparative ultracentrifuge, multi-purpose refrigerated centrifuge, microtube centrifuge, analytical and preparative electrophoretic/isoelectric focusing equipment, pulsed field electrophoresis system, thermocycler, DNA gel electrophoresis, Hoefer Daltsix for 2D eletrophoresis, Image Master 2D elite software, capillary electrophoresis system, ultra-low temperature freezer, universal texture testing machine, various colorimeters, U.V. and visible spectrophotometer, spectrofluorometer, electrokinetic analyzer, workstation for mathematical modelling and computer simulation, Linkham shearing stage/microscope, Nikon microscope (various attachements), controlled stress rheometer with a high temperature/ pressure attachment, controlled rate rheometer, Viscomat, and a rolling ball viscometer.

Educational Opportunities

Undergraduate (BASc) and graduate (MSc and PhD) programs are available through the Food Science and Technology program. Also post-doctoral research opportunities are offered. Graduate level class work and research opportunities relate to food science, seafood processing technology, marine oils, engineering design, packaging technology, fish post-mortem biochemistry, food microbiology, food rheology and food process science. Students with degrees in food science, engineering, chemistry/biochemistry, microbiology or biology are invited to apply.

Centre for African Studies

Phone: (902) 494-3814/1377
Fax: (902) 494-2105
Director: Theresa Ulicki

This Centre, established in 1975, advances instruction, publication, research and development education programs in African Studies. Associated faculty hold appointments in departments and units concentrated in the social sciences and humanities. The Centre organizes academic and informal seminars and public policy conferences on Africa and encourages interdisciplinary interaction at all levels on African subjects and issues. It co-operates with the International Development Studies department and with the Lester Pearson International Office.

Centre for Environmental and Marine Geology

Director: Professor D.B. Scott

This center was originally founded as the Centre for Marine Geology in 1983 to promote interdisciplinary studies of various types of problems in marine Geology, capitalizing on our unique position in Canada with links to related departments such as Oceanography, Physics, Biology, the Bedford Institute of Oceanography and our hosting of the Canadian office of the ocean Drilling Program. Since 1983 the role of the center has changed, reflected in the new name, which better describes the work being done now where marine geology is combined with environmental problems. We have 3 new faculty that expand our expertise into new chronological techniques and permafrost as well as strengthening our capacity in the petroleum-related environmental geology. Some of the objectives of the center are to: 1) continue to expand our participation in a revitalized east coast offshore energy related problems; 2) continue our climate-change work with a variety of approaches both offshore and on land; 3) expand into Arctic regions both with major oceanographic and shore-based programs; and 4) expand our capacity to help solve some of the many environmental geology problems associated with urbanization.

Centre for Foreign Policy Studies

Director: Dan Middlemiss, PhD

Established in 1971 the Centre is concerned with teaching, research, publication, policy advice and other professional activities in the various aspects of foreign policy, security studies and international politics. It is funded through the Security and Defence Forum of the Department of National Defence and other foundations, government agencies, international organizations, publications' sales, and contracts.

The Centre's work is concentrated in the area of Canadian and comparative maritime strategy and oceans policy, but it also deals with international political economy, regional and global development and peace-building and democratization. Its geographical specializations include foreign policy in Canada, Europe, the South (especially Africa, Asia and the Caribbean), and the U.S. The Centre encourages activities in these areas by Senior Research & Doctoral Fellows, and advances communication among local and international communities in these fields through seminars, workshops, conferences and colloquia, often co-sponsored by local, national and/or international organizations. It publishes occasional papers and monographs on comparative and Canadian defence and security policy issues.

The Centre is an integral part of the Department of Political Science. Centre faculty offer classes through the Department in foreign and defence policy, international relations and development, and maritime affairs at both undergraduate (majors & honours) and graduate (MA and PhD) levels. They also supervise masters and doctoral theses in these fields.

For further information, consult the Centre's website: www.dal.ca/~centre.

Centre for International Trade and Transportation

Location: 6100 University Avenue
5th floor, Suite 5063
Halifax, NS
B3H 3J5
Director: Gregory Hebb
Phone: (902) 494-1802
Fax: (902) 494-1483
Email: gregory.hebb@dal.ca
Administrative Secretary: Maggie Lapp
Phone: (902) 494-6553
Fax: (902) 494-1483
Email: m.e.lapp@dal.ca
Student Exchange Coordinator: Timothy Richard
Phone: (902) 494-2224
Fax: (902) 494-1483
Email: tim.richard@dal.ca

Website: http://ise.management.dal.ca

The Centre was established in 1975, and is primarily funded by Export Development Canada with a mission to foster international business teaching and research and enhance Canada's global competitiveness through innovative programs and outreach services. It carries out these functions within the administrative framework of the School of Business Administration. CITT supports a wide range of learning experience including the Foreign Business Program and the Student Export Awareness Program. Each year the Centre hosts the International Business Student Research Symposium, which is an opportunity for students to present their research to academic and business leaders. CIBS offers research fellowships to international business majors in their final year of MBA study.

Centre for Marine Vessel Development and Research (CMVDR)

Acting Director: Farid Taheri, PhD, PEng

The Centre was established in 1989 to provide specialized technical services to the Marine Industry. Emphasis is on pure and applied research in marine dynamics, with particular focus on the performance prediction analysis of marine vessels and offshore structures.

Areas of expertise include:
- Fundamental research in marine hydrodynamics
- Ship/boat motion and wave-loads, including response of offshore structures in waves
- Vessel seakeeping and safety studies, including swamping and capsize behaviour in extreme seas
- Optimal hull forms for minimum resistance
- Ship maneuverability in restricted waters
- Computer simulation of ship and offshore structure motions and flow fields
- Small Craft model tank tests
- Full scale tests, at sea

CMVDR has a policy to involve graduate students of the Naval Architecture Program as much as possible in its research contracts with industry.

Research Facilities:

Marine Craft Model Towing Tank
The marine craft model towing tank is located in the Civil Engineering Hydraulic Laboratory on Sexton Campus. The tank's dimensions are 1m x 1m x 30m. The carriage has a maximum velocity of 4.0m/s (13ft/sec) and can sustain a constant carriage speed over a usable rail length of 25m. The fully-automated carriage control system allows the operator to pre-select a desired test velocity profile so that a maximum constant velocity window is obtained within the safe operating limits of the tank.

A computer-controlled wave-making system is installed in the tank, comprising two wave-makers, one at each end. Each can act as a wave-maker or a wave-absorber. The system can make progressive or standing waves, as well as regular or irregular waves. The maximum wave height is about 0.3m (1 ft).

Computing Facilities
CMVDR and the post-graduate Naval Architecture Program has sophisticated and networked Computer Systems to support its advanced research work.

The computer systems are used for running numerical computations, required for the on-going development of numerical techniques to solve complex hydrodynamic problems. Advanced 2D and 3D visualization software is also developed on the systems so that real-time dynamic simulations can be carried out and displayed.

In addition to advanced hydrodynamic and hydroelastic software developed in-house, CMVDR has commercial hull design and analysis software packages, including FastShip, GHS, Shiphul 2000, AutoShip and ABS Safehull. These are used to complement research efforts, and to instruct naval architecture students.

RBC Centre for Risk Management, Faculty of Management

Director: Ronald Pelot, PhD, PEng
Phone: (902) 494-1769
Coordinator: Janet Lord, Centres for Integrated Research and Learning, Faculty of Management
Phone: (902) 494-7104
Website: riskcentre.dal.ca

The mission of the RBC Centre for Risk Management is to be a catalyst for the interdisciplinary study of risk and for knowledge transfer between the various fields of study on risk management. Approaches to the management of risk are of significant interest to most academic disciplines at Dalhousie and functional areas of operation within any industry. One of the important strengths of the RBC Centre for Risk Management is a multidisciplinary approach to the research and the involvement of partners from the public and private sectors. Dalhousie researchers will bring to the Centre expertise in disciplines such as:
- Decision Analysis: development of formal models of decision making;
- Engineering: reliability in geotechnical engineering and marine risk analysis;
- Statistics: estimation of probabilities and risk matrices for extreme events;
- Economics: exploration of utility, trade offs and cost/benefit analysis;
- Finance and Insurance: use of derivative instruments and insurance for managing risk;
- Public Administration: consideration of the dynamics and impact of institutional, legislative and regulatory decisions;
- Health Sciences: public health risk, workplace safety;
- Environmental Studies: assessment of local and global environmental threats;
- Information Management: framework for the organization of massive levels of information and access/security issues of information systems;
- Legal Studies: guidelines governing the rights and liabilities of contractual obligations designed to manage risk within national and international jurisdictions.

The RBC Centre for Risk Management will generate a regional, national, and international profile and create a source of competitive advantage for Dalhousie in an area of fundamental importance to public and private sector institutions. The accumulation of knowledge and skills in risk management will enrich individual faculty and strengthen the degree programs not only in the Faculty of Management's four Schools of Business Administration, Public Administration, Resource and Environmental Studies and Information Management, but also in virtually every other school and discipline on the Dalhousie campus including science, law, engineering, medicine, social sciences. The Centre could lead to the creation of a knowledgeable and effective workforce facing today's issues, and ultimately make the difference in building a strong and healthy society.

Guided by a prominent Executive Advisory Council, the Director of the Centre will engage in research and scholarly activities, generate funding through grants and contracts and develop conferences and programs in response to the educational demands of the risk management industry.

Centre for Water Resources Studies

Director: W.C. Hart, PhD

The Centre for Water Resources Studies was established in December, 1981, by a resolution of the Board of Governors (TUNS). The objectives of the Centre are to carry out applied research which contributes to the effective and sustainable protection of water resources in Atlantic Canada, nationally and internationally, and to facilitate the transfer of new knowledge to potential users. Research programs directed by the Centre address the design of cost-effective on-site wastewater systems, soil erosion processes, drinking water treatment, the use of roofwater cisterns for domestic water supply, eutrophication, watershed management and the computer modeling of hydrodynamic and hydrochemical processes. The Centre also has a number of research advisory panels, which involve professionals from industry, government and academia in applied research related to water use and water management.

Facilities

The Centre for Water Resources Studies is located on the fifth floor of "D" Building on Sexton Campus. Laboratory and office space is available for specific graduate research topics, as well as ongoing research carried out by Centre personnel. Analytical equipment includes instrumentation for determining low levels of major ions and nutrients, as well as trace quantities of metal ions in water. The Centre has apparatus for laboratory investigation and pilot scale testing of innovative water treatment methods using Dissolved Air Floatation (DAF) and ozonation and has worked with local consultants and municipalities to develop new applications of the technologies. The Centre is a North American leader in the development of on-site sewage disposal and has had an active research program in this area since 1987. In conjunction with the Nova Scotia Agricultural College, the Centre has a field laboratory investigating sloping sand filters and septic disposal.

Educational Opportunities

The Centre co-operates with academic units in the training of undergraduate and graduate students who have an interest in water resources. The Centre also participates in the program leading to a dual degree in water resources engineering and planning, in conjunction with the School of Planning into the Faculty of Architecture and Planning.

Eco-Efficiency Centre, Faculty of Management

Director: Ray Cote
Phone: (902) 494-6656
Technical Manager: Gerry McDonell
Program Coordinator: Penny Slight
Website: www.dal.ca/eco-efficiency

The Eco-Efficiency Centre (EEC) was established in 1998 as a partnership with Nova Scotia Power, Inc., and in 2005 was approved as a university centre in the Faculty of Management. It is currently linked to business, engineering, and resource and environmental studies programs. The EEC has achieved a national and international profile for its work in promoting research and action in relation to eco-efficiency and industrial ecology, especially in its application to industrial parks.

The objectives of the Centre are to:

1. develop and sustain eco-efficiency and industrial ecology research programs at Dalhousie University;
2. provide education, research and employment opportunities for students;
3. develop and provide information and resources related to eco-efficiency and industrial ecology to business and government;
4. develop models of environmentally sustainable industrial development thereby improving environmental and financial performance of small and medium enterprises (SMEs); and
5. foster sustainable business practices as models and develop local case studies for teaching purposes.

Eco-efficiency is identified as a dimension of competitive advantage for businesses. The research of the Centre provides SMES with the tools necessary to increase eco-efficiency by investigating and applying techniques such as pollution prevention, life cycle analysis and eco-industrial networking. The Centre's research also influences the development of new government policies at all levels using an action research mode. The Centre provides opportunities for students to learn, faculty to collaborate in new action research initiatives and businesses to improve their environmental performance.

Areas of collaboration in research include:

Environmental Studies - Life cycle analysis, energy and material metabolism, industrial symbiosis, ecological footprint analysis.

Business - input/output analysis, supply chain management, reverse logistics, environmental accounting, eco-efficiency studies, supply chain management, and education of personnel.

Engineering - process optimization, energy and material balances, pollution prevention, industrial symbiosis, environmentally friendly building materials, product and process design.

Planning - green building design and construction, industrial park planning, zoning, land use standards, infrastructure design.

Information Management - geographic information systems, life cycle and industrial metabolism database management.

Public Policy and Law - economic and industrial development policies, regulations, economic instruments.

With support from HSBC Bank Canada, the Centre and the Faculty of Management have established a high profile lecture series on business and the environment, which began in 2004. The Centre has developed relationships with organizations all over the world, including: the Canadian Eco-Industrial Network, the North American Eco-Industrial Development Council, the Eco-Industrial Network- Asia, the Symbiosis Institute, Denmark, and the United Nations Environment Program. These relationships have created opportunities for collaborative research in the areas of eco-efficiency, pollution prevention, and eco-industrial networking.

The continuing involvement of students and the increased focus on graduate research and research partnerships will assist in developing the research capacity and promote long term progress in eco-efficiency in Atlantic Canada and Canada generally. Co-op students are hired regularly and a new program will support Master of Resource and Environmental Management and Master of Business Administration students in completing internships involving both traditional and action research.

Eco-efficiency has been identified as a priority at all levels of government, particularly the federal government and agencies such as the Atlantic Canada Opportunities Agency and Industry Canada. The Centre has working relationships with the Atlantic Canada Opportunities Agency, Natural Resources Canada's Office of Energy Efficiency, Environment Canada, the Nova Scotia Department of Environment and Labour, Conserve Nova Scotia and Office of Economic Development, ant the Resource Recovery Fund Board Nova Scotia Inc.

European Union Centre of Excellence

Director: F. Laursen, PhD
Telephone: (902) 494-6611
Principal Investigator: R. Boardman, PhD

Established in 2006, the European Union Centre of Excellence in Canada gives Dalhousie University recognition from the European Union to carry out projects and activities that promote greater awareness of the EU in Canada. Dalhousie has joined three other centres in Canada with this title, located at Carleton University, the University of Toronto, and Université de Montréal/McGill University. While based in the Faculty of Arts and Social Sciences, with special emphasis on the Department of Political Science, this centre coordinates exchanges of faculty and students, conferences, workshops, symposia, and other projects and activities from other faculties as well, including Law, Management, and Science. Some of the activities include the study of international oil and gas, security issues, the EU and Africa, health issues, immigration, merger policy, biodiversity policy, and EU constitutional issues. Funds from the centre will also support activities in the Centre for Foreign Policy Studies and the Metropolis Project, and will support new EU teaching initiatives, as well as graduate students through fellowships and research assistantships. Support will also be provided to the Killam Library to strengthen its collection of EU materials.

Health Law Institute

Director: William Lahey, BA, B.A., LLB, LLM
Dalhousie University
6061 University Avenue
Halifax, NS B3H 4H9
Phone: (902) 494-6881
Fax: (902) 494-6879
Email: hli@dal.ca
Website: www.dal.ca/hli

An Interdisciplinary Institute of the Faculties of Law, Medicine, Health Professions, and Dentistry, the Institute is committed to the advancement of health law and policy and the improvement of health care practice and health systems in Canada through scholarly analysis, professional education, and public service. Its objectives are:

1. To foster strong and innovative health law and policy scholarship by:
   - contributing to research in health law and policy
   - providing external consultation services on matters having a significant impact on health law or policy
2. To advance health law and policy education by:
   - designing and implementing education programs for law, medicine, health professions and dentistry students
   - providing continuing education opportunities for health professionals and legal practitioners
3. To serve the public in our areas of expertise by:
   - contributing to the societal understanding of health law and policy issues
   - providing expertise to organizations in the public sector
   - engaging in the policy-making process at local, regional, and national levels.

Institute for Research in Materials (IRM)

Director: Mary Anne White, BSc, PhD
Administrative Offices: 6136 Coburg Rd.
Halifax NS B3H 3J5
Phone: (902) 494-6373
Fax: (902) 494-8016
URL: www.irm.dal.ca

Established in 2002, IRM is made up of about 100 faculty members in six faculties (Science, Engineering, Dentistry, Medicine, Architecture and Planning and Management) and seventeen departments. The goals of the Institute include advancing the collective interdisciplinary research efforts in materials science and engineering at Dalhousie University, facilitating interdisciplinary teaching in materials science within the existing discipline structure, and enhancing interactions between materials researchers at Dalhousie University with relevant government laboratories and industry, especially within the region. The Institute leads collaboration within the university on interdisciplinary applications to funding agencies for major equipment and research infrastructure, and collaborates with external organizations to pursue research opportunities.

All Dalhousie University faculty members carrying out research in the area of materials are eligible to be Members of IRM. Graduate students associated with these research groups are invited to become Associate Members of IRM. See www.irm.dal.ca/graduatestudies.php for details.

In addition to equipment operated by individual members of the Institute, IRM has established (2003) the Facilities for Materials Characterization, an $11 million suite of instruments managed by the Institute.

The equipment includes:

- High-field solid-state NMR spectrometer (managed jointly with the Atlantic Region Magnetic Resonance Centre)
- Scanning electron microscope
- Focused ion beam
- X-ray photoelectron spectrometer (XPS)
- Secondary ion mass spectrometer (SIMS)
- Sputtering system
- Ultra-high speed optical systems
- Physical properties measurement system (PPMS)
- Scanning thermal microscope (SThM)
- Beowulf computer system
- Ultrasonic immersion testing equipment
- Hot press
- Grindo Sonic
- High-speed motion recorder/analyzer.

These facilities are open to external users. Please contact IRM@dal.ca for details.

Law and Technology Institute

Director: Chidi Oguamanam, LLB, LLM, PhD
Associate Director: Michael Deturbide, BSc, BJ, LLB, LLM
Location: Dalhousie Law School
6061 University Avenue
Halifax, NS B3H 4H9
Phone: (902)494-1469
Fax: (902)494-1316
Email: lynda.corkum@dal.ca
Website: http://www.dal.ca/law/lati

The Law and Technology Institute was established at Dalhousie Law School in 2001 to provide teaching, research, and continuing education on technology law issues to students, faculty members, and the practicing Bar. The Institute participates, with the faculties of Computer Science and Management, in Dalhousie's Master of Electronic Commerce Program, and has commenced collaborative projects with the private sector and governments on information technology issues. Also, in conjunction with Dalhousie's Industry Liaison and Innovation Office, the Institute offers a student placement program in intellectual property and commercialization. Its faculty members provide graduate supervision to students interested in the developing field of technology law issues, and are active in law and technology organizations, such as IT.Can, and the International Society for Law and Technology. The Institute hosts an Eminent Speakers Series, which brings leading IT lawyers and academics to Dalhousie to share their expertise. The Institute is home to the Canadian Journal of Law and Technology, edited by Professors Deturbide and Scassa. The CJLT, which is published three times per year, is the pre-eminent technology law review in Canada.

Classes Offered:

- Law and Technology
- Internet and Media Law
- Privacy Law
- Intellectual Property Law
- Information Technology Transactions
- Entertainment Law
- Intellectual Property and Commercialization Placement

Students also have the opportunity to pursue specialized interests in fields such as health law and alternate dispute resolution, as they relate to law and technology.

Marine & Environmental Law Institute

Director: David L. VanderZwaag, MDiv, JD, LLM, PhD
Associate Director: Meinhard Doelle, BSc, LLB, LLB, JSD
Location: Dalhousie Law School
6061 University Avenue
Halifax, NS B3H 4H9
Phone: (902) 494-1988
Fax: (902) 494-1316
Email: MELAW@dal.ca
Website: www.dal.ca/law/MELAW

The Institute, which is housed in the Law School, carries out research and consultancy activities and also directs the MELP academic specialization. Its current Director and primary researcher is the holder of an appointment as a senior Canada Research Chair in Ocean Law & Governance. In addition to their scholarly research and publication activities, MELP faculty, associates and staff carry out research projects and provide advisory services to agencies of the United Nations, international non-governmental organizations, and regional organizations as well as assisting government departments and non-governmental organizations in Canada and overseas.

The Marine & Environmental Law Institute is also the editorial office of the Ocean Yearbook, a major international interdisciplinary annual, devoted to ocean affairs. Dalhousie law students have the chance to gain experience working as research assistants on the Institute's research projects and workshops, and assisting with editing the *Ocean Yearbook*.

The MEL Institute supports student collaboration in addressing environmental issues through the Environmental Law Students' Society and the East Coast Environmental Law Association, a non-governmental organization dedicated to environmental law education and advocacy. The MEL Institute encourages interdisciplinary collaborations within the Dalhousie community including the School for Resource and Environmental Studies (SRES), the Marine Affairs Program (MAP), the International Development Studies (IDS) Program, the Centre for Foreign Policy Studies, and the recently established Ocean Tracking Network (OTN) led by the Department of Oceanography. The MEL Institute also promotes national collaborations, for example, through the Ocean Management Research Network (OMRN). International linkages include, among others, the Global Forum on Oceans, Coasts and Islands and the IUCN Academy of Environmental Law.

Minerals Engineering Centre

Director: Georges J. Kipouros, Ph.D, P.Eng
Phone (902)494-6100
Location: 1360 Barrington Street
G. Building, Sexton Campus
Halifax, NS, B3J 2X4
Phone: (902)494-3955
Fax: (902)494-3506
Website: http://minerals.engineering.dal.ca

The Minerals Engineering Centre was established from the Laboratory for the Investigation of Minerals. The Minerals Engineering Centre provides research, analytical and advisory services to industries, universities, and government bodies in Atlantic Canada. The Centre is located in G Building on Sexton Campus and is affiliated with the Materials Engineering program. The services offered include:

- Sample preparation of ores, soils, silts, rocks, cores and clay fraction
- Size analysis, including screening, sieving, and sub-sieve analysis
- Dense liquid analysis
- Preparation of thin sections
- Physical and chemical analytical methods using atomic adsorption, spectographic and wet chemical techniques
- Analysis of samples including geological, metalliferous ores, industrial minerals, coals, metals, alloys and water
- Mineral processing test work covering the whole range of investigative techniques from bench scale to pilot plant, including crushing, grinding, classification, gravity separation, dense medium separation, magnetic separation, electrostatic separation, flotation, flocculation, thickening, filtration, and drying
- Evaluation of biomass fuels.

The Minerals Engineering Centre provides opportunities for undergraduate and graduate students to learn various analytical and mineral testing techniques applicable in their course of studies. It also offers services to faculty members to assist in their teaching and research activities.

Further information may be obtained from the Director of the Centre.

Neuroscience Institute

Director: Steven Barnes, PhD.
Contact: neuroscience.institute@dal.ca
Website: www.neuroscience.dal.ca

The Neuroscience Institute was founded in 1990 to promote and coordinate research in neuroscience, the modern interdisciplinary study of the brain and nervous system. The development of the Institute paralleled the establishment of many such institutes throughout the world and marks the dramatic progress in understanding the workings of the brain.

The Institute serves as an umbrella organization to foster research and training in neuroscience at Dalhousie. A major objective is to increase understanding of the functions of the nervous system in health and disease and, to this end, the Institute coordinates the activities of neuroscientists in the Faculty of Medicine and the Faculty of Science, facilitating collaboration between clinical and basic scientists in the two Faculties. Some foci of current research activity include: the autonomic nervous system; development and plasticity of the nervous system; and, sensory physiology. The Institute also provides a vehicle to seek new sources of funding, and will encourage new initiatives in all areas of neuroscience research at Dalhousie. In addition, the Institute promotes and coordinates training programs in neuroscience currently offered through its constituent departments at both the undergraduate and graduate levels. It sponsors a seminar series annually, and coordinates a variety of community outreach events.

Norman Newman Centre for Entrepreneurship

Director: David Roach, MBA, PEng
Coordinator: Janet Lord, Centres for Integrated Research and Learning
Phone: (902) 494-7104
Website: entrepreneurship.dal.ca

The Norman Newman Centre for Entrepreneurship is a research unit within the Faculty of Management. The centre is led by a Director who will engage in research and generate funding through grants and contracts. Faculty across the University have the opportunity to be affiliated with the Centre and can be appointed as research associates. The associates support the activities of the Centre though research, student supervision and participation in seminars, workshops and conferences. Successful entrepreneurs and faculty from other universities are able to participate in the Centre as affiliates.

The primary objective of the Centre is to create a focus for research and curriculum development related to entrepreneurial activity in all of its many forms. Research and teaching concentrate on understanding the successful identification, evaluation and exploitation of entrepreneurial opportunities by both new and established companies.

Other objectives:

- The products of its research contribute to the body of knowledge in an area of practical significance.
- It establishes an organization base to support entrepreneurial activities and initiatives in the Dalhousie community.
- The Centre gives the university a vehicle which can be used to reach out to stakeholders in the local community.
- It provides a platform for national and international linkages with other academic institutions that are involved in the field of entrepreneurship.

The Nova Scotia CAD/CAM Centre

Location: 1360 Barrington Street
P.O. Box 1000
Halifax, NS B3J 2X4
Fax: (902) 422-8380
Contact: Debbie Brown, Administrative Assistant
(902) 494-3242

Established: April 29, 1983, as a cost-recovery, industry-oriented Centre within Dalhousie. It is primarily affiliated with the Departments of Mechanical and Civil Engineering, but also works with all other departments.

Mandate: As set out in an agreement with the Province of Nova Scotia, Dalhousie established an "industry-oriented CAD/CAM Centre to assist provincial manufacturers and consulting engineers to develop, design and utilize CAD/CAM applications". Recently, the Centre has undergone a variety of changes and is now comprised of two new groups, the Intelligent Structures and Innovative materials (ISIM) Group and the Advanced Manufacturing Group. It is also pleased to announce that it is home to the Canada Research Chair in Structural Health Monitoring which was awarded to Dr. Jean-Francois Trottier, PEng in June 2001.

Director: Dr. Jean-Francois Trottier, PEng
(902) 494-3990
Admin. Assistant: Debbie Brown
(902) 494-3242

Advanced Manufacturing Group

Coordinator: Dr. Andrew Warkentin (494-3901)
Manager: Mr. Robert Warner, PEng (494-6096)

Manufacturing, research and technical support services to:
- Dalhousie Faculty of Engineering
- private industry
- government agencies: DND, DREA, BIO

Areas of Expertise:
- CAD/CAM training and technical support in MasterCAM, SmartCAM, Solid Edge and Pro/Engineer and Unigraphics
- prototype design and machining with CNC machines
- rapid plastic part prototypes by injection molding
- reserve engineering and inspection with a Mitutoyo CNC Coordinate Measuring Machine (CMM)

Mr. Warner teaches IENG 3321: Manufacturing Processes, and as PACE Coordinator for the University teaches Sold Edge and Unigraphics in Design and Graphics I (GNGI 1100), Design and Graphics II (MECH 2100), Manufacturing (MECH 4000) and Design Project I (MECH 4010).

Intelligent Structures and Innovative Materials (ISIM) Group

Adjunct Associat Professor: Dean Forgeron, PEng, PhD (494-2847)
Research Professional: Christopher Barnes, P Eng (494-3904)
- R&D of novel reinforcing fibers and other materials for use in concrete
- fibre reinforced concrete, shotcrete and high performance concrete and their applications
- composite and advanced materials
- advanced sensors for intelligent structured health monitoring of buildings and structures
- remote monitoring and intelligent data processing
- innovative steel-free concrete decks for bridges, wharves and parking garages
- modeling of buckling and post-buckling failures
- operates ISIS - Halifax
- Non-destructive Infrastructure Inspection Applications using Impact-Echo, Spectral Analysis of Surface Waves and Ground Penetrating Radar
- resonant frequency testing of materials
- stiffness profiles of layered media and material specimens
- bridge deck deterioration
- continuous pavement layer thickness
- waterproofing membrane integrity
- detection of voids under jointed portland cement concrete pavements
- detection of water under pavements

Equipment & Software Available for Industry and Dalhousie Use
- MasterCAM, Solid Edge, Pro/Engineer, Unigraphics
- CNC milling centre Mori-Seiki MV Junior 3-axes
- CNC turning centre lathe Mori-Seiki SL-25
- Impact-Echo Inspection System
- Spectral Analysis of Surface Waves Inspection System
- Resilient modules testing of materials
- Co-ordinate Measuring Machine (CMM), Mitutoya measuring range of 13" x 20" x 12"
- Impact testing machine Tinius Olsen Izod - Model 66
- Digital surface roughness gage
- Injection Molding Machine (25 Ton Arburg, 30 gram shot capacity)
- Ground Penetrating Radar Infrastructure Inspection System (400MHz to 1500 MHz)
- ASTM C1609.06 closed-loop testing
- Australian Round Determinate Panel test
- South African Waterbed test
- Creep and fatigue of materials

Technology Transfer Activities
- contracts from and joint ventures with companies, industry and government
- training programs for industry and government
- technical and application advisory service
- research and development
- technical services
- prototype development
- use of facilities

Actively Seeking
- collaborative projects (Research and Development)
- access to specialized equipment and facilities
- specialized testing contracts

Support by:
- Canada - Nova Scotia cooperation Agreement on Technology Development
- Natural Sciences and Engineering Research council of Canada (NSERC)
- Canada Research Chairs Program (CRC)
- Canadian Foundation for Innovation (CFI)
- Atlantic Fiber Technologies Limited

Trace Analysis Research Centre

Director: A.Chatt, BSc, MSc, PhD

With the assistance of a grant from the National Research Council, the Centre was established in 1971 to train analytical chemists and, through research, to contribute to the advancement of analytical chemistry. A major facility of the Centre is a low-power nuclear reactor (SLOWPOKE) which is available to researchers within Dalhousie and elsewhere.

Vehicle Safety Research Team

Director and Principal Investigator: C.R. Baird, PhD, PEng

The Vehicle Research Safety Team (VSRT) is one of six university-based teams located across Canada. These teams operate on a non-profit basis under contract to Transport Canada (Surface), and were established to conduct research into vehicular crashes.

The VSRT has been in operation since 1972 and, in addition to participating in national programs, has been involved in several other studies, including an on-going and expanding program of seeking out and examining alleged safety-related defects. The major portion of the program is geared to relating injuries from vehicular-crashes to the injury-causing mechanisms or sources in vehicles. As such, results of collision studies are continually being related to Transport Canada Vehicle Standards.

The team is composed of two professional engineers from the Faculty as well as two full-time investigators, one of whom is a professional engineer. In addition, an advisory committee exists, providing liaison and interaction with medical personnel, policing agencies and provincial transportation authorities. The VSRT has special research interests in causal factor evaluation methods, in computer-aided collision reconstruction, in data base management and modular analysis procedures, particularly in relation to injury severity and injury-causal factors.

The team is currently participating in a number of national programs including injuries associated with air-bag deployments and side impact collisions.

Resources and Services

1. Alumni Association/Alumni Relations

The Alumni Association is comprised of over 100,000 graduates of Dalhousie University. A global network of volunteers keeps alumni informed and involved with the university. By providing many programs and services, the Association fosters a strong relationship between Dalhousie and its alumni.

Dalhousie alumni play a vital role in the health and future of the university. Many alumni return to Dalhousie regularly to hire graduating students. They also serve as advocates, ambassadors and student mentors. The financial support provided by our alumni helps ensure that Dalhousie will continue to provide exceptional post-secondary education to future generations.

The Alumni Association's Board of Directors works with the Dalhousie Alumni Relations Office, located in the Macdonald Building (494-8801/1-800-565-9969). Together, the Association and Alumni Relations strive to identify opportunities for alumni involvement, and to foster an environment that invites alumni to participate fully in Dalhousie's well-being. Visit the website at www.dal.ca/alumni.

2. Anti-Plagiarism Service

Plagiarism is considered a serious academic offence. At the recommendation of Senate (June 2002), Dalhousie subscribed to Turnitin.com. Academic Computing Services and the Dalhousie University Libraries jointly support this service. Faculty who wish to use this service can get started at http://integratedlearningonline.academiccomputing.ca/Learner%20Resources/Turnitin.com/.
Resources for developing awareness among students, and to help them avoid plagiarising are available at http://learningandteaching.dal.ca/nas/ai.html

3. Athletics and Recreational Services

Athletics and Recreational Services offers a wide range of programs for every Dalhousie student. An extensive program of club and intramural activities offer fun, fitness and competition while 14 varsity sports provide excitement for athletes and spectators alike. For those who prefer recreational activities, there are a great number of fitness, leisure and aquatic instructional programs.

Recreation facilities on campus include: Dalplex-offering a 50,000 sq. ft. fieldhouse, international-size pool, two weight rooms, two regulation-size hardwood basketball/volleyball courts, numerous "no-fee" racquet courts, an indoor jogging track, a rock climbing centre, a golf driving cage, and family-fitness features such as the Fun Zone play area, a family change room; Dalhousie Memorial Arena, Studley Gym, and F.B. Wickwire Memorial Field (one of Canada's largest artificial playing surfaces). The Cardio Fitness Centre, as well as babysitting services, are available for additional fees. The F.H. Sexton Memorial Gymnasium on the Sexton Campus includes a gym, weight room, squash court and other facilities. For details on fitness and recreation at Dalhousie contact Dalplex at 494-3372, F.H. Sexton Memorial Gymnasium at 494-3550, the Intramural Office at 494-2002 or visit www.athletics.dal.ca.

4. Black Student Advising Centre

The position of the Black Student Advisor was created by Dalhousie University, initiated by the Black Canadian Students' Association, to provide information to assist and support new, prospective and returning students of African or Black descent. The Centre is intended to foster a sense of community with other students on campus and to increase intercultural awareness.

The advisor may organize program activities and arrange local community tours which assist students in developing contact within the African Nova Scotian Community. The advisor can provide confidential services, individual and/or group assistance, impartial observation, relevant resource materials, along with a referral service which may benefit your academic, personal and social development on and off campus.

There is a small student resource room for meeting, peer support, reading and studying. Information is also available on scholarships, bursaries, employment and upcoming community events.

The Centre is meant to be beneficial to ALL students, faculty and staff as a means of increasing awareness and sensitivity to students of African or Black descent and their issues and presence within the University community.

For further information contact: phone (902) 494-6648; fax (902) 494-8013; email BSAC@dal.ca; webpage www.dal.ca/bsac

5. Career Services Centre

The Career Services Centre assists you in:

- exploring a full range of career and work possibilities that match your career goals;
- preparing job-search competencies and tools to present yourself effectively as a candidate for employment;
- obtaining information on employment opportunities and prospective employers;
- connecting with career opportunities through campus interviews, job and volunteer listings, referrals, direct application, networking, job-search events, publications, and/or information technology; and
- developing and maintaining relationships with organizations that provide career development and employment opportunities for you.

Please refer to Career Services Centre website at www.dal.ca/csc for more information on programs and services.

6. Centre for Learning and Teaching

The Centre for Learning and Teaching (CLT) works in partnership with academic units, faculty members, and graduate students to enhance the practice and scholarship of learning and teaching at Dalhousie University. CLT takes an evidence-based approach to advocating for effective learning and teaching practices, curriculum planning, services to support the use of technology in education, and institutional policies and infrastructure to enhance the Dalhousie learning environment.

Programming. To fulfill this primary goal, CLT organizes a range of programming for faculty and teaching assistants. Workshop series, presentations, and demonstrations are scheduled to address the full spectrum of educational issues, including curriculum design, evaluation of student learning, teaching and learning strategies, and the effective integration of instructional technology. All workshops are open to the full Dalhousie community.

Confidential Consultations. Confidential consultations on teaching and learning issues are also available to colleagues. The Peer Consultation Program pairs experienced colleagues who have been recognized for their teaching excellence with colleagues seeking to improve students' learning. In addition, CLT staff members provide consultation services to graduate students, faculty, and administrators on a wide range of topics.

Annual Events: On an annual basis, CLT coordinates New Academic Staff Orientation, TA Days, Recording Teaching Accomplishment Institute, and the Dalhousie Conference on University Teaching and Learning that brings together presenters from across the University and the country to explore issues related to specific themes. CLT also organizes several university-wide teaching awards, including the Dalhousie Educational Leadership Award, the Alumni Award of Excellence for Teaching, and the President's Graduate Teaching Assistant Award.

Certificate in University Teaching and Learning: The Certificate program is offered to graduate students by the CLT in collaboration with the Faculty of Graduate Studies. The purpose of the program is to assist academic departments in preparing students for their teaching responsibilities and to enhance their professional development opportunities for other careers.

Grants: The CLT administers a small number of grants to assist faculty engaged in pedagogical initiatives aimed at enhancing student learning.

Publications: The CLT newsletter, Focus on University Teaching and Learning, is published twice a year and is available online on the CLT website (www.learningandteaching.dal.ca). Also available online is University Teaching and Learning: An Instructional Resource Guide for Teaching Assistants at Dalhousie University. Available to purchase or borrow from CLT are Recording Teaching Accomplishment: A Dalhousie Guide to the Teaching Dossier and Learning through Writing: A Compendium of Assignments and Techniques. CLT's lending library includes both print and video resources on topics related to teaching that may be borrowed by faculty, teaching assistants, and students.

Teaching and Learning with Technology: A division of the Centre for Learning and Teaching, Instructional Media Services (IMS), offers expertise and support to the university in the areas of classroom design, media production, presentation technology, and technical services.

- Studley Audio-Visual Classroom Services supplies equipment, training, and support to students, staff, and faculty. AV Staff provide technical support for classrooms and operate equipment loan pools on Studley campus, as well as assist with classroom design and equipment installations across all three campuses.
- Video and Audio Production Services offers a full range of creative and production services for educational, promotional, or other academic or administrative purposes. Staff bring creative and technical expertise to productions for broadcast, for the web, or for the classroom.
- Technical Services repairs and services electronic equipment and provides expert advice on the design and installation of classroom technology systems. For IMS locations and contact information see http://learningandteaching.dal.ca/ims.html.

Distance Education: CLT provides consultation on the development of distance education courses, and maintains an information Website for students and faculty (www.distanceeduation.dal.ca). Information about specific Distance Education courses or programs is also available from the Registrar's Office.

For further information, teaching resources, or a confidential consultation, you are invited to contact the Centre for Learning and Teaching, located at Suite G90, Killam Library, 6225 University Avenue (494-1622), (CLT@dal.ca), or you can visit the CLT website at: http://learningandteaching.dal.ca

7. Counselling Services

The Counselling Services Centre offers programs for personal, career and learning disability concerns. Counselling is provided by professionally-trained counsellors and psychologists. Strict confidentiality is ensured. Counselling is available both individually and on a group basis. Topics covered by regularly offered group programs, or individual counselling, include Career Decision Making, What to do with a Degree in . . . , Exam Anxiety Reduction, Public Speaking Anxiety Reduction, Grief and Loss, Sleep and Relaxation, Overcoming Procrastination, Anger Management, and Attention-deficit Disorder. Information on a wide variety of careers and academic programs is available in The Frank G. Lawson Career Information Centre. The Internet, CD-ROMS, reference files and books, magazines and newsletters, as well as a variety of takeaway tip sheets, all form part of the Centre's large and growing resource collection.

The Counselling Services offices and its Frank G. Lawson Career Information Centre are located on the 4th Floor of the Student Union Building. In addition to regular office hours, the Centre is open one evening a week during the academic year. Inquire or make appointments by dropping in or calling 494-2081. Detailed information on services and the scheduling of group programs and workshops is available on the Dalhousie Counselling Services website: www.counsellingservices.dal.ca.

8. DalCard

The DalCard (also referred to as the Dalhousie University ID Card or Banner Card) is a convenient multi-purpose card, which gives the cardholder access to various facilities and services. The DalCard is an identification card and also serves as a debit card for retail and vending purchases on and off campus; for printing at Academic Computer Labs; printing and photocopying at the Libraries; Dalplex membership and access card; and a residence meal plan and access card - all in one! The DalCard must be presented to write an officially scheduled examination or to use the library facilities. In addition, some services such as the issuance of bursary or scholarship cheques, require the presentation of a valid DalCard.

The DalCard Office is located at 1443 Seymour Street. Students on the Sexton campus may obtain the DalCard at the Student Service Centre, B Building, 1360 Barrington Street. Employees may obtain a DalCard at the DalCard Office or at the Student Service Centre on the Sexton campus. See www.dal.ca/dalcard for more information.

9. Dalhousie Arts Centre

Designed as a multipurpose facility, the Dalhousie Arts Centre is home to four University departments: Dalhousie Arts Centre (Rebecca Cohn Auditorium), Dalhousie Art Gallery, and the two academic departments of Music and Theatre. The Arts Centre is an integral part of the cultural experience in our community and stands as the only arts complex of its kind in Nova Scotia.

Of the numerous performing arts spaces in the Dalhousie Arts Centre, the Rebecca Cohn Auditorium, is the most familiar and prestigious. The 1040 seat concert hall is the home of Symphony Nova Scotia, as well as the venue of choice for a wide variety of performers ranging from The Royal Winnipeg Ballet to Blue Rodeo, The Chieftains, and Stomping Tom to name a few. Other performing and visual arts spaces in the Arts Centre include: The Sir James Dunn Theatre (240 seats), the David Mack. Murray Studio, Studio II, The MacAloney Room, and the Art Gallery.

The Dalhousie Art Gallery offers the public access to national and international touring exhibitions and initiates many ambitious and exciting exhibition programs.

The Dalhousie Music Department presents weekly noon hour recitals in the Arts Centre. The Department also maintains a full production season including a faculty recital series and student ensemble concerts with music ranging from classical to jazz and contemporary. Further information on the Music and Theatre Departments can be found in their separate listings.

10. Dalhousie Multifaith Centre

The chaplains at Dalhousie provide confidential counselling on personal and spiritual issues and provide opportunities for prayer and worship, retreats, workshops and social outings. The Centre provides a non-threatening environment where students and staff can address the basic questions of meaning and purpose in their lives.

Chaplains currently represent the Anglican, Buddhist, Christian Reformed, Jewish, Lutheran, Muslim, Roman Catholic, and United Church faith traditions. They are, however, available and receptive to all students, faculty, and staff regardless of religious background or can refer you to religious leaders of many other denominations and religions. For students who are concerned about religious groups on campus, the chaplains have developed four brochures, "Dalhousie Multifaith Centre," "Religious Groups: What to Expect, What to Accept, and What to Avoid," "Places of Worship At and Near Dalhousie," and "Frequently-Asked Questions on the Dalhousie Multifaith Centre."

In the event of an emergency, contact the Student Union Building information desk at 494-2140 for chaplains' home telephone numbers. Feel free to drop by the office any time to introduce yourself and to find out more about the office and its services. Visit the website at www.dal.ca/dmc.

11. Dalhousie Student Union

Every Dalhousie student is automatically a member of the Dalhousie Student Union. The Student Union is recognized by an agreement with the University Administration and by an Act of the Nova Scotia legislature as the single voice of Dalhousie students. All student activities on campus are organized through the Student Union, and the Student Union is the focus of all student representation. The business of the Student Union is conducted by a Council made up of 40 members. Every student is represented by one or more representatives of their faculty, elected within their faculty in the spring. As well, a number of other constituency groups are represented on the Council because they are uniquely affected by

many campus issues. Also on the Council are the student representatives elected to the Senate and Board of Governors.

One of the most important resources of the Student Union is the Student Union Building located at 6136 University Avenue between Seymour and LeMarchant Streets. The SUB, which is owned by the University and administered, managed and controlled by the Student Union and is paid for through Student Union fees, was opened in 1968 as a centre for student activity on campus. The Student Union Building provides a wide range of services for students including the Student Advocacy Service, Travel Cuts, The Grawood, Campus Copy, food services, and much more. Every student has the opportunity to take advantage of the Union's financial, physical and organizational resources. Students have an opportunity to become involved in committees dealing with various student issues. The DSU also offers over 175 clubs, societies and organizations for students to participate in. All students are invited to satisfy their curiosity by visiting the Student Union Council offices. The Student Council office is located on the second floor of the SUB in room 222 and is open from 8:30 a.m. to 4:30 p.m. Monday through Friday, phone number 494-1106 or email dsu@dal.ca. Check out the website at www.dsu.ca, or my.dsu.ca.

12. Housing/Residence Services

The University is pleased to guarantee housing in University-owned properties for all new students. It is, however, important that students planning to attend Dalhousie think well in advance about their accommodation needs.

Students should be aware of several important points of reference in regard to residence accommodation. Upon admission to a program of study, all students will receive university housing information. They will also be asked to pay an Admission Deposit. It is important to apply to residence (online) and to pay the Admission Deposit promptly as the dates these are received will determine when the Residence Application is considered. Residence applications will not be considered from individuals who have not gained admission to a program of study.

Students with disabilities are encouraged to contact the Residence Office at (902) 494-1054, or email: housing@dal.ca, for information and assistance.

The traditional style residences at Dalhousie are chiefly for undergraduate students; very few graduate spaces are allocated and in many cases students pursuing advanced degrees are not prepared to live with the exuberance of first and second-year students. All students living in traditional style residences are required to participate in one of the meal plan options available.

The information below gives a description of 1. traditional on-campus residences, 2. non-traditional on-campus housing which includes apartment style housing owned by the university, 3. the services offered by the off-campus housing listing service, and 4. general information. For information on housing fees, see the Fees section of the Calendar.

It is the responsibility of the individual student in all cases to make a separate online application to the university housing of her/his choice, or utilize the listing services provided by the Off-Campus Housing office.

Although accommodation in residence is guaranteed, students must apply online and are encouraged to submit their residence application immediately upon receiving their letter of academic admission.

1. Traditional On-Campus Residence

A. Studley (Main) Campus

i. Howe Hall

Centrally located on campus, Howe Hall, provides accommodation for 700+ undergraduate students. The sprawling, grey ironstone complex is divided into 6 houses: Bronson, Cameron, Fountain, Henderson, and Smith. Houses are co-ed. Each house has its own distinctive identity and student government. The ratio of seniors to first-year students is approximately 30/70.

The houses offer both double and single rooms with singles assigned to senior undergraduates and first-year students and doubles for first-year students. Facilities include a dining room, lounges, television rooms in each house, a canteen, games room, squash courts, study areas, laundry rooms, computer room and 24-hour front desk. Within residence rooms, ResNet (high speed Internet), local telephone service and cable TV service are provided.

ii. Shirreff Hall

Shirreff Hall provides accommodation to 407 students. Located in a quiet corner of the campus, it is minutes from classes, the library, Dalplex and other facilities. Shirreff Hall is divided into 4 areas - Newcombe House (female only), while Old Eddy & New Eddy are co-ed, with alternating female and male floors. Old Eddy and New Eddy have both single and double rooms while Newcombe has single rooms only.

Shirreff Hall offers a dining room, an elegant library and visitors' lounge, study areas, computer rooms, games room, television lounges, kitchenettes, canteen, laundry room, and 24-hour front desk. ResNet (high speed Internet), local telephone service and cable TV service are provided within each room. Students also have access to two pianos.

iii.Eliza Ritchie Hall

Opened in 1987, Eliza Ritchie Hall is a co-ed residence. It provides traditional residence accommodation for 92 students in predominantly single rooms.

This three-storey building is located close to the Dalplex and to Shirreff Hall, where students normally have their meals. Facilities include study rooms, a multipurpose room, reception area, laundry facilities, leisure lounges with kitchenettes and, within each room, ResNet (high speed Internet), local telephone service and cable TV service are provided.

iv. Risley Hall

Dalhousie's newest co-ed residence, Risley Hall, opened in September, 2004. It is located on LeMarchant Street, behind the Student Union Building, and offers 490 single rooms, primarily to undergraduate students. Services include a dining room, laundry rooms, television lounges, computer room and a 24-hour front desk and within each room ResNet (high speed Internet), local telephone service and cable TV service are provided.

v. Lyall House, DeMille House, Colpitt House

These properties, which were formerly faculty offices, have been converted into 3 mini-residences with a shared courtyard. There are a total of 49 single rooms in a co-ed living environment, with comfortable common space available to residents of each house. As in other residences, a meal plan is required and meals are usually eaten at Howe Hall. Services include a shared laundry area, ResNet (high speed Internet), local telephone service and cable TV service.

B. Sexton Campus

i. Gerard Hall

Gerard Hall is a 12-story traditional style co-ed residence that houses 200+ students in single and double rooms. It is located at the corner of Morris and Barrington Streets. Gerard Hall offers laundry facilities, a computer lab and a big screen TV, DVD player and satellite access in the main lounge. Within residence rooms, ResNet (high speed Internet), local telephone service and cable TV service are provided. Gerard Hall residents commonly use the O'Brien Hall dining hall, only seconds away, or may use the dining halls in Howe Hall, Risley Hall or Shirreff Hall.

2. Non-Traditional On-Campus Housing, including apartments

A. Studley (Main) Campus

i. Residence Houses

Dalhousie also has two residence houses, which are co-ed. Formerly single family homes, each house has kitchen, living room and washroom facilities which are shared among the residents in the house. The character of these homes has been maintained as much as possible. Although they are generally occupied by students in graduate programs or professional schools, a few spaces are reserved for undergraduates.

These houses have only single rooms, each with a bed, wardrobe, study desk, lamp and chair. Linen, cooking utensils and small appliances are not

provided. A trained senior student acts as a House Assistant and liaises with the Residence Life Manager to provide administrative and resident related services. ResNet (high speed Internet), local telephone service and cable TV service are provided. Meal plans are not mandatory, but may be purchased separately to use at any dining hall on campus.

ii. Glengary Apartments

Located on the Studley Campus on Edward Street, Glengary Apartments is a four-storey brick building offering co-ed accommodation for 40 students. Preference is given to senior undergraduates, especially to those who apply in groups of three.

Glengary has 12 furnished apartments, each with space for three students in three single rooms. Each apartment includes a kitchen, living room and bathroom. There are also four furnished bachelor apartments which are always in high demand. Laundry facilities are located in the basement, where there is also a limited amount of storage space. ResNet (high speed Internet), local telephone and cable TV service are provided in all apartments. Coordinators are available for security and administrative services and also act as a resource for students who may need advice or assistance.

B. Sexton Campus

i. Graduate House

This facility houses 14 graduate students, aged 25 and older, in single rooms. It is located a short walk from Gerard Hall on Morris St. ResNet (high speed Internet), local telephone service and cable TV service are provided.

Meal plans are not mandatory, but may be purchased separately to use at any dining hall on campus.

ii. Fenwick Place

Dalhousie's 33-storey Fenwick Place offers students the privacy and the independence of apartment living. Located in south end Halifax, it is only a 15-minute walk or a short bus ride from Studley campus, or a 5- minute walk to Sexton campus. Fenwick houses both single students and families in a harmonious living environment.

Many of the 252 apartments in Fenwick Place are furnished to accommodate students in groups of two, three or four. Priority is given to students who apply in groups or to those who are currently living in a Dalhousie residence. Each of these apartments has a full kitchen and bathroom, furnished living room and dining area and a balcony. Bedrooms have desks and a mate-style bed. Heat, hot water and electricity are included in the residence fee. ResNet (high speed Internet), local telephone and cable TV service are included in all apartments.Linens, dishes, utensils, bedding and small appliances are not provided.

Fenwick also has a number of unfurnished bachelor, one and two-bedroom apartments which are rented to single students or families. Each of these apartments has a full kitchen and bathroom. Heat, hot water, and satellite television are included in the rent. Laundry facilities are available on every floor of Fenwick Place. The front desk is open 24 hours a day with staff available to provide security, information and advice to students. ResNet (high speed Internet), local telephone and cable TV service are included in all apartments.

3. Living Off-Campus

Dalhousie's Off-Campus Housing office assists students who do not want to live on campus or who have been unable to find a place in residence or in University apartments and houses. Located in Risley Hall, this office is designed to help students find off-campus accommodation.

The Off-Campus Housing office provides centralized information on available housing in the Halifax metro area, including apartments, shared accommodations, rooms, condos and houses. Up-to-date computerized printouts of these listings are available for viewing as well as telephones for calling landlords and material such as maps and transit schedules.

Off-Campus Housing has a website: http://www.dal.ca/och. You can search for accommodations as well as list your own place at no charge if you are a Dalhousie student.

Although the housing staff cannot arrange, inspect or guarantee housing, they will do everything they can to help students find accommodation that is pleasant, inexpensive and close to campus.

Because of the relatively low vacancy rate in Halifax, it is advised that students start looking for off-campus housing well ahead of the academic year.

4. General Information

- Online applications must be accompanied by an application fee in Canadian funds, payable to Dalhousie University. Fee and deposit amounts are listed on the Housing website (www.dal.ca/housing).
- Acceptance into an academic program guarantees a place in residence, but a separate housing application, submitted online, is required.
- To live in any of the University-owned buildings, students must maintain full-time status at Dalhousie throughout the academic year.

For further information on living at Dalhousie, or for a hard copy of the residence application form, do not hesitate to contact:

Howe Hall, Eliza Ritchie Hall, Shirreff Hall, Gerard Hall, Risley Hall and Mini Residences

Location: Residence Office
1443 Seymour St.
Dalhousie University
Halifax, N.S. B3H 3M6
Telephone: (902) 494-1054
Email: housing@dal.ca
Website: www.dal.ca/housing

Fenwick Place, Glengary Apartments, Graduate House and Residence Houses

Location: Accommodation Office
Fenwick Place
Dalhousie University
5599 Fenwick Street
Halifax, N.S. B3H 1R2
Telephone: (902) 494-2075
Email: fenwick@dal.ca
Website: www.dal.ca/housing

Director of Housing, Conference and Ancillary Services

Location: 1443 Seymour St.
Dalhousie University
Halifax, N.S. B3H 3M6
Telephone: (902) 494-3365

Off-Campus Housing

Location: Off-Campus Housing
Risley Hall, Room 1023
1233 LeMarchant Street
Halifax, N. S. B3H 3P6
Telephone: (902) 494-2429
Email: och@dal.ca
Website: www.dal.ca/och

ResNet

Location: Dalhousie University
1443 Seymour St.
Halifax, NS B3H 3M6
Telephone: (902) 494-8036
Email: resnet@dal.ca

13. International Student & Exchange Services

The International Student & Exchange Services (ISES) office is committed to welcoming, supporting and servicing new and returning international and exchange students to Dalhousie. ISES provides a resource and activity centre for international students. Advisors are available to meet with students on a variety of issues including finances, immigration matters, exchange opportunities, health insurance and personal issues. Referrals are also made to other areas on campus when necessary. The ISES Office organizes orientation activities that assist international students in adjusting to a new culture and in achieving their educational and personal

goals. A variety of social, cultural and information programs are also held throughout the year. The International Student Advisor is also available to meet with students on Wednesday morning at the Student Service Centre (Sexton Campus) at 1360 Barrington Street.

Student exchange and study abroad services are facilitated by the Student Mobility Advisor at the ISES Office. This branch of the office promotes student mobility by assisting departments and faculties with the establishment of student exchange agreements, managing university-wide exchange programs, advising students on international study, work and volunteer opportunities, providing pre-departure and re-entry services, administering the Study Work International Fund (SWIF) and the George Burris Study in England Bursary, and maintaining the International Opportunities Resource Library.

The ISES Office is located in Room G 25 the Killam Library. You can email the ISES Office at ises@dal.ca, or by calling (902) 494-1566.

14. Lester Pearson International (LPI)

Lester Pearson International (LPI) was founded in 1985 to promote Dalhousie's involvement in international development activities. In 1987, LPI merged with the Centre for Development Projects and was given responsibility for the guardianship of all externally-financed international development programs and projects at Dalhousie. Since then, its mandate has been further expanded to support a broader range of activities which help to internationalize the university.

In general, LPI supports the Dalhousie community's involvement in international activities. Towards this end, LPI helps to develop, support and oversee the university's international projects; coordinates a development education program entitled DAL-Outreach which organizes seminars and events; disseminates information concerning international activities and opportunities to both the external and internal communities; serves as the university's International Liaison Office/Officer (ILO) which provides a central contact point for donor agencies, international officials/embassies, etc.; facilitates the university's international agreements and maintains the Agreements of Cooperation Register; and hosts many official international visitors, visiting scholars, and delegations to the university. Although LPI is not an academic unit of the university, it encourages and supports the study of international issues and serves as a resource centre for students, faculty and staff. LPI is located in the Henry Hicks Academic Administration Building on the third floor.

15. Libraries

The Dalhousie University Library System is organized to accommodate the needs of the undergraduate teaching programs, graduate and faculty research projects, and professional schools. The system is made up of the following components: the Killam Memorial Library - Humanities, Social Sciences and Science, the Sir James Dunn Law Library, the Kellogg Health Sciences Library, and Sexton Design and Technology Library - Architecture, Engineering, and Planning.

As of April 1, 2007, the holdings of the Dalhousie Libraries include over 1,900,823 volumes of books, bound periodicals, documents and bound reports, 452,520 microfilm and microfiche, 95,235 maps and other media, 10,906 music scores and 11,798 music recordings. The libraries subscribe to 61,482 serials titles, including 57,132 electronic titles.

Dalhousie libraries participate in Novanet, a network which shares a single automated online catalogue of the holdings of the member libraries (Mount Saint Vincent University, Nova Scotia College of Art & Design, Saint Mary's University, University College of Cape Breton, University of King's College, the Atlantic School of Theology, St. Francis Xavier University, Nova Scotia Agricultural College and Nova Scotia Community College). Users borrow from Novanet libraries upon presentation of their University ID card.

16. Mature Student Services

Mature Student Services assists individuals 23 years of age and older who have been out of high school for at least 4 years, and anyone without a high school diploma wishing to gain entrance to university.

Services include pre-admission counselling and university preparation courses, such as Writing for Academic Study, Chemistry, Physics, Academic Math, Pre-Calculus. Call 902-494-2375 or visit http://collegeofcontinuinged.dal.ca.

17. Office of Human Rights, Equity & Harassment Prevention

The overall mandate of the Office of Human Rights, Equity & Harassment Prevention is to foster and support an inclusive working and learning environment where all members of the University community share responsibility for establishing and maintaining a climate of respect.

The Office is responsible for administering a number of University policies including: the Accommodation Policy; the Employment Equity Through Affirmative Action Policy; complaints based on the Statement of Prohibited Discrimination; the Personal Harassment Policy; and the Sexual Harassment Policy. The Human Rights & Equity Advisor and the Harassment Prevention Advisor also liaise with the Office of the Vice-President, Student Services, regarding the Code of Student Conduct.

Other initiatives in the Office of Human Rights, Equity & Harassment Prevention include education and training on topics such as diversity, accommodation, harassment awareness and prevention, conflict resolution and more. Workshops are offered regularly for students, faculty and staff.

The website for the Office of Human Rights, Equity & Harassment Prevention offers downloadable versions of each of the policies, information on the education and training opportunities offered, and additional resources including an annual Mosaic Calendar featuring a variety of religious and cultural holidays, and a Diversity Glossary.

Contact:	Bonnie Best-Fleming, Human Rights & Equity Advisor Gaye Wishart, Harassment Prevention Advisor
Where:	Room 2, Basement Level, Henry Hicks Academic Administration Building, Studley Campus
Phone:	494-6672 / 494-1137
Fax:	494-1179
Email:	hrehp@dal.ca
Website:	www.hrehp.dal.ca

18. Office of the Ombudsperson

The Dalhousie Office of the Ombudsperson offers assistance and advice to anyone experiencing problems with the Dalhousie community, including difficulties associated with finances, academics, or accommodations. This student-run office can help resolve particular grievances and attempts to ensure that existing policies are fair and equitable. Jointly funded by the University and the Dalhousie Student Union, the Ombudsperson can provide information and direction on any University-related complaint. Clients retain full control over any action taken on their behalf by the Office of the Ombudsperson, and all inquiries are strictly confidential.

The Office of the Ombudsperson is located in Room 106, 1321 Edward Street. Regular office hours are posted on the door at the beginning of each semester. The Ombudsperson can be reached by phoning (902)494-6583 or by Email: ombudsperson@dal.ca, Website: ombudsperson.dal.ca.

19. Registrar's Office

The office is responsible for high school liaison, admissions, awards and financial aid, registration, maintenance of student records, scheduling and coordinating formal examinations, and convocation. Of greater significance to students, however, is the role played by members of the staff who provide information, advice, and assistance. They offer advice on admissions, academic regulations and appeals, and the selection of programs. In addition, they are prepared to help students who are not quite sure what sort of assistance they are looking for, referring them as appropriate to departments for advice about specific major and honours programs or to the office of Student Services or to specific service areas such as the Counselling Services Centre. The Registrar's Office also mails tens of thousands of letters and packages annually in response to requests for information and student records, from application to graduation and beyond.

Among the staff are people with expertise in financial aid and budgeting who are available for consultation.

The fact that the Registrar's Office is in contact with every student and every department means that it is ideally placed to provide or to guide students and prospective students to the source of the advice or assistance they need.

Students can access the services of the Registrar's Office at two locations. The main office is located in Room 133 of the Henry Hicks Academic Administration Building on the Studley Campus. Students attending classes at Sexton Campus can also access Registrar's Office services at the Student Service Centre which is located in Building B on the Sexton Campus.

Inquiries may be directed to:
The Registrar
Dalhousie University
Halifax, NS
Canada B3H 4H6
Telephone: (902) 494-2450
Fax: (902) 494-1630
Email: admissions@dal.ca

20. Student Accessibility Services

Dalhousie University is committed to providing an accessible environment in which members of the community can pursue their educational goals. Ongoing efforts consistent with a reasonable and practical allocation of resources are being made to improve accessibility and provide special services.

The Advisor provides support and advocacy for students with disabilities. In cooperation with faculty, staff, and other student services at the University, the Advisor endeavours to provide appropriate support services as needed by the student. Early consultation is advised to ascertain that we can fulfill your needs. We can be contacted by phone: voice (902) 494-2836, or by email (access@dal.ca). Please refer to our website for further information: www.studentaccessibility.dal.ca.

Please note that due to chemical sensitivities of persons who work and frequent this office, our environment must be scent free.

21. Student Advocacy Service

The Student Advocacy Service was established by the Dalhousie Student Union and is composed of qualified students from the University. The main purpose of the Service is to ensure that the student receives the proper information when dealing with the various administrative boards and faculties at Dalhousie. An Advocate may also be assigned to assist students with academic appeals or in a disciplinary hearing for an academic offence. Our goal is to make the often unpleasant experience of challenging or being challenged by University Administration less intimidating.

The Advocates may be contacted through:

Location:	Student Advocacy Service Room 310 Dalhousie Student Union Building
Telephone:	(902) 494-2205
Email:	dsas@dal.ca
Website:	www.dsu.ca/services/advocacy

22. Student Clubs and Organizations

Students seeking information on clubs and societies should call the Dalhousie Student Union offices at 494-1106 or check the DSU Website at www.dsu.ca. Extracurricular activities and organizations at Dalhousie are as varied as the students who take part in them. Organizations range from small informal groups to large well organized ones; they can be residence-based, within faculties, or university-wide. Some are decades old with long traditions, others arise and disappear as students' interests change. A list of clubs, societies and organizations is available every fall to new students who are encouraged to select and participate.

23. Student Services

Located in Room G28 on the Main Floor of the Killam Library, the Office of the Vice-President, Student Services, provides a point of referral for any student concern. The Vice-President, Student Services, is the chief student services officer, coordinating the activities of student services across campus: Student Academic Success Services (which encompasses Academic Advising; the Black Student Advising Centre; the First-Year Advising Centre; Learning Connections; the Multifaith Centre; Student Accessibility Services; Studying for Success Program; Tutoring Service; the Writing Centre); Athletics and Recreational Services; Bookstores; Career Services Centre and Volunteering; Conference and Ancillary Services; Counselling Services; Health Services; Housing; International Student and Exchange Services; Office of the Ombudsperson; Registrar's Office; Sexton Student Service Centre; Trademarks; University Food Services.

Students who experience difficulties with their academic programs or who are uncertain about educational goals, major selection, honours or advanced major information, degree regulations, changing faculties, inadequate study skills, or conflicts with faculty and regulations, can seek the assistance of the Academic Advisors in the Vice-President's Office.

24. Studying for Success

As part of Student Academic Success Services, Studying for Success offers programs to help you reach your academic potential during your time at Dalhousie. Our primary goal is to assist you in becoming a more efficient and effective learner. Help is available by group and individually. Workshops are offered to small groups of students to develop or enhance personal learning strategies and, when applicable, are customized to focus on particular disciplines or fields of study ensuring that the workshop content is relevant to your needs. Topics regularly covered include time management, getting the most from lectures, getting the most from textbooks, delivering oral presentations, writing research papers, preparing for and writing exams. Students who could benefit from individual assistance may also book an appointment with one of our personal coaches.

For more details contact Studying for Success:
Room G28, Main Level, Killam Library
Telephone: 494-3077
Website: http://sfs.studentservices.dal.ca/

25. Tutoring Service

The Dalhousie Tutoring Service matches students who require tutoring in a particular subject, with upper-year and graduate student tutors. For information on finding or becoming a tutor, consult the Tutoring Service website at www.dal.ca/tutoring.

26. University Bookstore

The University Bookstore, owned and operated by Dalhousie, is a service and resource centre for the university community and the general public. The Bookstore has all required and recommended texts, reference books and supplies, as well as workbooks, self-help manuals and other reference material. As well, you can find titles by Dalhousie authors.

The Stationery department carries all necessary and supplementary stationery and supplies. The Campus shop carries gift items, mugs, clothing and crested wear, cards, jewelry, class rings, backpacks, novelties and briefcases. A Special Order department is located at the customer service area and will order and ship books worldwide.

The Bookstore is situated on the lower level of the Student Union Building on University Avenue, and is open year round, Monday to Saturday (Hours vary throughout the year).

The Health Sciences Bookstore has the largest and most complete medical book section in Atlantic Canada, with over 2,000 titles in stock. Thousands of other titles are specially ordered annually, and the department ships out books to consumers and hospitals throughout the world. The Health Sciences Bookstore is located in the Dentistry building, 5981 University Avenue, and is open year round, Monday to Saturday. Hours vary throughout the year.

The Sexton Campus Bookstore is located in the Student Service Centre at 1360 Barrington Street (Building B) and is open from 9:00 a.m. - 4:00 p.m. Monday to Friday. It supplies texts and reference books required for Architecture and Engineering students as well as crested clothing, stationery and other supplies.

The Bookstore recently added an e-commerce component to their services. The Community can order any item the Bookstore carries and have it delivered to their door. Visit us at www.dal.ca/bookstore today!

27. University Computing and Information Services

University Computing and Information Services (UCIS) provides computing and communication services for students, faculty and staff for instructional, research and administrative purposes. The department is responsible for all centrally managed computing, networking and telecommunications facilities.

UCIS manages a variety of systems including email, MyDal, Blackboard Learning System (BLS), net storage, web servers and many others. UCIS also supports numerous computer labs which are situated throughout the campuses. All students may have access to campus computing facilities on an individual basis or in conjunction with the classes that they take. Network ports or wireless connections for personal computers are available in several campus locations and in residence rooms.

Computer Help Desks are located in the Killam Computer Centre and in the B Building. Sexton Campus. UCIS also manages the campus computer store (PCPC), provides non-credit computer courses, offers a hardware maintenance service for computers, a web authoring service, an Electronic Text Centre and is a partner in the Killam Library Learning commons.

UCIS manages a campus-wide communications network which interconnects all areas of the university. This network is connected to the CANARIE research and education network and to the Internet.

28. University Health Services

The university operates a medical clinic, in Howe Hall, at Coburg Road and LeMarchant Street staffed by family doctors, nurses and a psychiatrist. Further specialists' services are available and will be arranged through the Health Service when indicated. All information gained about a student by the Health Service is confidential and may not be released to anyone without signed permission by the student.

Appointments are made during the clinic's open hours, from 9 a.m. to 10 p.m., Monday to Friday and 10:00 a.m. to 6:00 p.m. Saturday and Sunday, by calling 494-2171. In the event of an urgent medical problem, students may seek medical advice during clinic hours. After hours, students may wish to seek assessment at the local emergency room. The QEII emergency room on Summer Street is the closest emergency room.

All students must have medical and hospital coverage. All Nova Scotia students are covered by the Nova Scotia Medical Services Insurance. All other Canadian students must maintain coverage from their home provinces. This is especially important for residents of any province requiring payment of premiums. All non-Canadian students must be covered by medical and hospital insurance prior to registration. Details of suitable insurance may be obtained from the Student Accounts office prior to registration. Any student who has had a serious illness within the last 12 months, or who has a chronic medical condition, may wish to contact and advise the Health Services; preferably with a statement from the doctor. Further information is available on our website at www.healthservices.dal.ca.

29. Volunteering

Please refer to Career Services Centre.

30. Writing Centre

The Writing Centre's programs recognize that students in all disciplines are required to write clearly to inform, persuade, or instruct an audience in term papers, laboratory reports, essay examinations, critical reviews and more. Students benefit from discussing their work with supportive instructors and peer tutors.

The Centre currently offers a number of services. The main office in the Learning Commons allows students to obtain advice on writing issues. Tutors also work part of the week at the Sexton Library, the Kellogg Library, and the Rowe Building. Finally, seminars are held throughout the university year on topics such as essay writing, science writing, mechanics of writing, English as a second language issues, admission applications, etc.

Contact the Writing Centre by visiting the main office in the Learning Commons, calling 494-1963 or emailing at writingcentre@dal.ca. Students can also obtain information on services, hours of operation, and links to writing resources at www.writingcentre.dal.ca.

Awards

PLEASE NOTE: The contents of this awards section are subject to change without notice.

The University reserves the right to publicize the recipients of merit awards.

I. Faculty of Graduate Studies Scholarships and Fellowships

A. General Disciplines

1. Faculty of Graduate Studies Scholarships

Each department has a limited number of scholarships available for students pursuing a degree program on a full-time basis. Scholarships are not offered to anyone on leave from a job with salary continuation. Those wishing to be considered for scholarship assistance are advised to contact the Graduate Coordinator in the department to which they are applying for details on eligibility and deadlines (NOT the Faculty of Graduate Studies). Graduate Coordinator contact information can be found at www.dalgrad.dal.ca/departments/. Maximum eligibility for scholarships is two Master's years and the first four Doctoral years, but some departments may have shorter maxima.

In general, Faculty of Graduate Studies Scholarships will be paid to the student in regular monthly payments on the 27th of each month, after University tuition and fees have been deducted. Payments are made by automatic bank deposit. Deposit advice statements are available on dal online. Where warranted, with permission of the Dean of Graduate Studies, a student may receive scholarship funding for a maximum of 12 months while pursuing research off-campus.

Very well qualified scholars who receive awards from federal agencies may also receive Dalhousie supplements within the limits set down by the FGS and/or agencies offering the awards.

Killam Predoctoral Scholarships

Killam scholars are selected on the basis of nominations made by departments. It is expected that nominees will also have applied for funding from relevant national or international agencies for which they are eligible. Canadian students are eligible for nomination for the Killam Scholarships only if they have applied for the relevant national scholarship (NSERC, SSHRC, CIHR, etc.).

Only those students registered in a program with a thesis requirement are eligible to hold the Killam Predoctoral Scholarship.

Killam scholarship holders must be eligible to receive scholarship support for at least two years. This means that at the Masters level only newly entering students will be considered. Renewal is upon evidence of satisfactory performance at a required minimum level. Masters students may hold a Killam Scholarship for 24 months and Doctoral students for up to 36 months. The scholarships will be valued at $20,000 (2008-2009) for a Master's program and $25,000 (2008-2009) for a Doctoral program. Tuition/fees are not waived and must be paid out of the award, but additional funds to assist with transportation to Halifax, and differential fees for foreign students will be supplied. Killam scholars may perform instructing or demonstrating duties, and, if they do, will be given additional remuneration for these services through the employing department.

Killam scholarships are open to both Canadians and non-Canadians. PLEASE NOTE: Candidates do not apply for these Scholarships. On the basis of the information in a completed application for admission the graduate department concerned may nominate the student to the selection committee. Contact the department Graduate Coordinator for further information.

Eliza Ritchie Doctoral Scholarship for Women

The Eliza Ritchie Doctoral Scholarship was established to commemorate Women's Centennial Year (1985) and to recognise the contribution to Dalhousie of one of its most important nineteenth-century graduates. After completing her undergraduate studies at Dalhousie in 1887, Eliza Ritchie (1856-1933) became one of the first Canadian women to receive a PhD degree (Cornell University, 1889). She cut short her professional career at Wellesley College to return to Halifax in 1899, where she devoted her energies to feminist and cultural causes, and to Dalhousie, for the rest of her life. She was the first warden of a Dalhousie women's residence (Forrest Hall, 1912-13), the first woman to serve as a member of the Dalhousie Board of Governors (1919-25), a founding member of the editorial board of the *Dalhousie Review*, and the first woman to receive an honourary degree from Dalhousie (LLD, 1927). Scholarships are awarded to Canadians and permanent residents only and preference given to candidates from the Atlantic Provinces. Among such applicants preference will be given to those in disciplines in which women are under represented. The award will have a value of $24,000 (2008-2009) for a 12-month academic period at Dalhousie and is renewable (upon application) for two additional years. One scholarship may be awarded each year. The deadline for receipt of the prescribed applications is March 15th. Additional information and application forms (new or renewal) are available on the Faculty of Graduate Studies website at www.dalgrad.dal.ca/forms/student/#eliza.

James Robinson Johnston Graduate Scholarship for African Canadians

The James Robinson Johnston Graduate Scholarship is supported by the Faculty of Graduate Studies and the Endowment for the James Robinson Johnston Chair in Black Canadian Studies at Dalhousie as part of the commitment of the Johnston endowment and the university to support the development of Black Canadian scholars in graduate studies and the professions. James R. Johnston was Dalhousie's first black graduate in the Law Faculty in 1898 and was a major figure in the legal profession and the Black community throughout his short life. Today young African Canadians can be found pursuing studies in the arts, sciences, health professions and management as well as the traditional professions of law, dentistry and medicine. This scholarship is intended to provide an opportunity for promising African Canadian students to pursue their work at the graduate level.

To be eligible, applicants must have been accepted, by the application deadline, into a program of study in any discipline in which Dalhousie offers a graduate degree. Successful applicants are normally expected to have attained scholarship standing.

Successful candidates for an initial award and for renewals will be identified by the Faculty of Graduate Studies Scholarship Committee. The general rules for Dalhousie Graduate Scholarships will be applied except that, in the case of this scholarship, the award must be taken up initially in the first year of the degree program.

Scholarships are valued at $15,000 (Master's level) and $19,000 (Doctoral level) per year (2008-2009, subject to review) for a twelve-month academic year of full-time study. The tuition and fees are not waived and must be paid out of the award. Scholarships may be renewed, subject to satisfactory annual progress review, for one additional year (Master's level) or two additional years (Doctoral level). Scholarship awards can not extend beyond two years of Master's level study or four years of doctoral level study. Renewal is not automatic, but must be applied for using the renewal application forms. Application forms for new awards and for renewal awards are available from the Faculty of Graduate Studies website at www.dalgrad.dal.ca/forms/student/#jrj. The deadline for receipt of new and renewal applications is March 15.

Nova Scotia Black and First Nations Students Graduate Entrance Scholarships

Dalhousie University offers two entrance scholarships, awarded annually, to First Nations and Indigenous Black students entering a Dalhousie graduate program for the first time following graduation from a Dalhousie University undergraduate program. The objective of these scholarships is

to increase the representation of Indigenous Black and First Nations communities in the university's wide diversity of graduate programs, and ultimately in the academy and in advanced professional occupations.

To be eligible, applicants must have been accepted, by the application deadline, into a graduate program at Dalhousie. This may be at the Master's or Doctoral level, and may include professional, course-based or thesis-based programs. Students must have been accepted with an admission GPA of 3.3 (B+) or higher. Admission GPA's are based on the last two years (six terms) of undergraduate study. Recipients of this scholarship must begin full-time academic study at Dalhousie in the academic year for which it has been awarded.

Successful candidates for an initial award and for renewal will be evaluated by a special Scholarship Committee constituted by the Dean of the Faculty of Graduate Studies. The general rules for Dalhousie Graduate Scholarships will be applied except that, in the case of this scholarship, the award must be taken up in the first year of the degree program. These scholarships are valued at $15,000 each and are renewable for a maximum of one year (three academic terms) for students maintaining good standing in the first year of their program. Renewal is not automatic, but must be applied for using the renewal application forms. Eligibility, conditions and application forms for new and renewal awards are available from the Faculty of Graduate Studies web site at www.dalgrad.dal.ca/forms/student/#nsbafn. The deadline for receipt of new and renewal applications is March 15.

President's Award
At Dalhousie we actively recruit the brightest minds and deepest thinkers; graduate students who will push the innovation agenda and shape the future. The President's Awards provide a competitive edge at Dalhousie to attract and retain those PhD students who are successful in the competition for national scholarships.

This award is targeted to students starting PhD programs who have a full doctoral scholarship from one of the specified agencies. The Specified Agencies are NSERC (PGSD or CGSD), SSHRC (Doctoral or CGSD), CIHR (Doctoral or CGSD), and/or Killam (Doctoral). The award will cover tuition but not international differential fees or other student fees. It will be granted for up to the first two years for PhD students.

The award will be granted for each term that the student is registered as a full time student, paying full tuition (i.e., not continuing fees) provided that the student is receiving a full doctoral scholarship from one of the specified agencies and that tuition is not covered by any other award, agency or government.

The Faculty of Graduate Studies will notify eligible students and departments following admission. The Award will be verified and applied to the student's tuition each term for the duration of the award.

The Vitamin Scholarship
The Vitamin Scholarship was established for research and education related to vitamins and vitamin products (vitamins A, B1 to B6, B8, B9, B12, C, E, H, ß-carotene, canthazanthin, methionine, and products containing or being derived from these vitamins). Applications from students interested in pursuing research and/or educational activities in nutritional or food related programs, or consumer services and protection activities are also considered.

Thesis Masters and Doctoral students with a first class average who intend to pursue studies and research related to vitamins and vitamin-related products are eligible to apply. Masters level scholarships will be for one year only, while doctoral level scholarships may be renewed for one additional year. Award recipients will be identified by the Faculty of Graduate Studies Scholarship Committee.

The general Dalhousie Graduate Award Rules are applied, except that the Award must be taken up upon commencing the first year of the degree program. The Award is valued at $19,000 (Masters) and $21,000 (Doctoral) (2008-2009) for a twelve-month academic year (1-2 awards per year). It is tenable only at Dalhousie University.

Fees are not waived and must be paid out of the award and students must be accepted to Dalhousie before they apply.

The application and annual renewal request deadline is February 15th.

B. External Scholarships

There are numerous scholarships available from external funding agencies that can be held by students pursuing graduate studies at Dalhousie (and other Universities). A database containing information about these scholarships is available at www.dalgrad.dal.ca/funding/#external.

C. Specific Disciplines

1. Architecture

The Henry Adams Medal and The Henry Adams Certificate
Field of Study: Architecture.
Eligibility: Students graduating from the MArch program.
Number and Value: One medal with a certificate, and one certificate of merit.
Basis of Award: Top-ranking students who have achieved general excellence throughout the four years of the professional program.
Donor or Awarding Agency: American Institute of Architects, Washington, DC.
Selection: School of Architecture
Application: Application not required.

Adjeleian Award in the Aesthetics of Structures
Field of Study: Architecture or Structural Engineering.
Eligibility: A graduating student in either the MArch program or the Civil Engineering degree program. The award alternates between Architecture and Civil Engineering. (It will be made to Architecture next in 2009.)
Number and Value: One, $1,000 (subject to annual review).
Tenure: One year.
Basis of Award: The award will be granted to the graduating student who demonstrates in a project both aesthetic principles in buildings or bridges and unified roots of Architectural and Structural Engineering.
Donor or Awarding Agency: Dr. John Adjeleian.
Selection: School of Architecture.
Application: For Architecture, an application is not required.

The Alpha Rho Chi Medal
Alpha Rho Chi, National Social-Professional Fraternity of Architecture, awards the Alpha Rho Chi Medal to a graduating senior of the School of Architecture who has shown an ability for leadership, performed willing service for the School, and gives promise of real professional merit through attitude and personality.

The Alumni Memorial Award
This award, which was initiated in 1984 in the memory of Mr. Michael Kravosky, B.Arch.'83, is awarded each year to a graduating student elected by the graduating class for outstanding service to the school in student activities and affairs. The award is made from the proceeds of the Architecture Alumni Memorial Fund, and is subject to annual review.

The Architects' Association of New Brunswick Scholarship
This scholarship of $1000 was established by colleagues to the Heinz Fleckenstein Memorial Fund, with additional contributions from the AANB and Dalhousie Architecture Alumni. The scholarship is awarded to a student who is a permanent resident of New Brunswick and is entering the Master of Architecture program. The recipient must demonstrate strong design ability with functional solutions, and an aptitude and knowledge in areas beyond design. The scholarship is awarded in September. No application is required.

Jonathan Hart Memorial Fund
This fund was established in memory of Jonathan Hart, MArch '96, by Mr. Justice Gordon Hart and Mrs. Catherine Hart, following Jonathan's request to support architecture in the community. Proceeds from this fund are used periodically to bring architectural work to the public, and to encourage young architects and businesses to work together on projects for the betterment of the community. Selection is made by the School of Architecture.

Barry Johns Scholarship for Design
This $1000 scholarship, donated by Barry Johns (BArch 1972), is awarded to the student entering the Master of Architecture program who completed the entire BEDS program at Dalhousie University with the highest average grade in Design courses. No application is required. The selection is made by the School of Architecture Scholarship Committee.

William P. Lydon Scholarship
This scholarship of $1200 was established in memory of William P. Lydon, a founder of Lydon Lynch. An insightful natural leader, Bill gently encouraged people to realize their potential. He understood the societal value of architecture and its capacity to uplift the human spirit. Bill himself, it seemed, elevated nearly all who knew him. The award is given to a student who has completed the Bachelor of Environmental Design Studies and is entering the Master of Architecture program. The recipient must demonstrate goodwill, kindness, generosity and respect for others, qualities that defined Bill's character, be actively involved in community services, and have a higher than average academic standing. The scholarship is awarded in April.

Nova Scotia Association of Architects - Ojars Biskaps Award
The Ojars Biskaps Award honours the memory of Professor Ojars Biskaps, who provided distinguished service to both the academic and professional architecture communities of Nova Scotia. Professor Biskaps was a beloved teacher at the School of Architecture, a significant designer working in collaboration with local architecture practices, and past president of the Nova Scotia Association of Architects. His love of drawing, as a means of documentation, inquiry, storytelling, and humour, characterized his work and life. This $1000 award is given by the School of Architecture to a student who has completed the BEDS program and is entering the MArch program, based on a Year 4 portfolio that integrates academic study and design practice, and uses drawing for architectural inquiry and expression.

The Nova Scotia Association of Architects Prize
The Nova Scotia Association of Architects gives a prize to a student who, in the final year of the MArch program, displays an outstanding awareness of the architect's responsibility to society by demonstration in his/her scholarly and design work.

Nova Scotia Association of Architects Scholarship
Field of Study: Architecture.
Eligibility: A student entering the final year of the MArch program who is a native of Nova Scotia or has had his/her permanent residence in Nova Scotia for some years, and who plans to enter the architectural profession upon graduation.
Number and Value: One, $1,000 (subject to annual review).
Basis of Award: Record of academic excellence.
Donor or Awarding Agency: Nova Scotia Association of Architects.
Selection: School of Architecture.
Application: Application not required.

The William Nycum & Associates Limited Scholarship
Field of Study: Architecture
Eligibility: A student who has successfully completed the first term of the MArch program.
Number and Value: One, $1,000.
Tenure: One year.
Basis of Award: This scholarship is awarded to the student who most strongly demonstrates creative thinking and a passion for architecture. The scholarship is given to assist the recipient's studies. Candidates are requested to submit a one-page application demonstrating commitment to architecture.
Donor or Awarding Agency: William Nycum & Associates Limited.
Selection: School of Architecture.
Application: Apply to Director, School of Architecture.
Application Deadline: December 1.

George W. Rogers Award
This award of up to $1000 was established in memory of Donald L. Dunkee, Professor of Architecture at the University of Manitoba for 25 years. The award was named in honour of his student, George W. Rogers, a successful Halifax architect who has been an RAIC member, active in the community, and has received a Governor General's Award for Architecture. The award is given to a Canadian student who has earned a Bachelor of Environmental Design Studies degree and is entering the MArch program. The recipient must be active in student life, extra-curricular and community activities; demonstrate potential to contribute to the architecture profession; and display exceptional academic standing. Financial need may be a consideration. The scholarship is awarded in April. No application is required.

Bruce and Dorothy Rosetti Scholarships
Field of Study: Architecture.
Eligibility: One or more students in the first year of the MArch program with a consistently high record of performance.
Number and Value: Up to six per year, up to $3,500 each (subject to annual review).
Basis of Award: To assist students in carrying out supervised research.
Donor or Awarding Agency: Estate of Bruce and Dorothy Rosetti.
Selection: School of Architecture.
Application: Apply to Director, School of Architecture.
Application Deadline: Third Friday in November.

The Royal Architectural Institute of Canada Student Medal
The Royal Architectural Institute of Canada's Student Medal is awarded annually to a student graduating from a professional degree program in each School of Architecture in Canada who, in the judgment of the faculty of the respective School, has achieved the highest level of academic excellence and/or has completed the outstanding final design thesis for that academic year.

The Royal Architectural Institute of Canada Honour Roll
For each School of Architecture, a maximum of four individual students, from the top ten percent of the graduating class in the profession degree program, shall receive honour roll certificates from the RAIC, in addition to the top student, who shall also receive the RAIC Student Medal.

School of Architecture Thesis Prize
The School of Architecture awards a book prize to one or more students who have completed an outstanding design thesis in the MArch program.

Walter Gardner Stanfield Scholarships
Field of Study: Architecture or Planning.
Eligibility: Students entering the first term of a graduate program in the School of Architecture or in the School of Planning.
Number and Value: One $1,000-$2,000 (subject to annual review).
Basis of Award: Applicants will be expected to have demonstrated, in the quality of work submitted in support of their application, both academic excellence and outstanding preparedness for the program to be undertaken in the Faculty.
Donor or Awarding Agency: Estate of Walter Gardner Stanfield.
Selection: Faculty of Architecture and Planning. Selection will be made by the appropriate admissions committee. All applications for graduate study received by the first day of the summer term prior to entering the program will be considered automatically, and recipients will be notified two weeks later.

Steel Structures Education Foundation Scholarship for Excellence in Steel Design
This $2,000 scholarship, donated by the Steel Structures Education Foundation, is awarded to a Master of Architecture student who has completed MArch Thesis Preparation. It is intended to support subsequent thesis design work that uses structural steel in a critical way. Applications are due on the first Friday in January. Selection is made by the School of Architecture. Following the completion of the thesis, a report is required for publication by SSEF.

John D. Watson Memorial Scholarship
This scholarship is awarded in remembrance of John D. Watson (MArch 1990), who passed away in 1998. It provides $1,500 for a Master of Architecture student to pursue thesis-related research in green design, sustainability, and/or new technologies. These funds may be used for travel. Applicants must have a satisfactory academic record, demonstrate financial need, and submit a proposal of study to be carried out during the following work term, followed by a research report a month after the end of the work term. Apply to the School of Architecture by November 30.

The Ernest Wilby Memorial Scholarship
Field of Study: Architecture.
Eligibility: A student entering the penultimate year receives this award. The award is given annually, commencing with the most easterly school in Canada and continuing each year to the most westerly, then repeating. (The scholarship was last awarded in 2004, and is expected to be awarded again in 2014.)
Number and Value: One, $1,000.
Basis of Award: Financial need, as well as definite promise and talent.
Donor or Awarding Agency: The Royal Architectural Institute of Canada, on behalf of the Wilby Foundation.
Selection: School of Architecture.
Application: Application not required.

2. Business Administration

Centre for International Business Studies First Year Graduate Scholarship
One scholarship of $1000 is offered to a first year MBA student majoring in International Business. The scholarship recipient is selected on the basis of a career interest in international business and academic performance.

Dover Mills Fellowship in International Business
The Dover Mills Fellowship in International Business was created with a generous endowed gift to Dalhousie's Capital Ideas Campaign by Dover Mills Limited. The $5000 fellowship is available to three full-time Atlantic Canadian students entering the final year of MBA studies, who are specializing in international business. Fellowship recipients will be selected on the basis of a career interest in international business and academic performance to date.

Goldberg-Schulich Award for Entrepreneurship
The Nevada Capital Corporation in 1984 donated the sum of $29,000 to establish an award in memory of Meyer Goldberg of Halifax, NS This award is available to a student entering the second year of Dalhousie University's MBA Program. Deadline for receipt of application is March 15th.

NORTHSTAR Trade Finance - Mary Grover LeBlanc Memorial Fellowship - International Business
The Northstar Trade Finance-Mary Grover LeBlanc Memorial Fellowship in International Business was created by Scott Shepherd, MBA '83. The $3000 fellowship is available to two students studying international business. Candidates must be Canadian citizens or landed immigrants, and have a strong academic record to date.

3. Chemistry

Donald R. Arnold Scholarship
The Donald R. Arnold Scholarship is awarded to the student with overall excellence in chemistry, especially in the field of organic photochemistry and who has demonstrated exceptional aptitude for research.

Gerry Dauphinee Graduate Scholarship in Chemistry
The award recognizes the contribution of Professor Dauphinee to the Department of Chemistry at Dalhousie University. This scholarship rewards a graduate student in chemistry who has shown excellence in research and in teaching.

Kenneth T. Leffek Prize for the Best PhD Thesis in Chemistry
This prize was established in recognition of Professor Leffek's contribution to Dalhousie University and to the profession of chemistry in Canada. Normally, one award is made in May each year.

Douglas E. Ryan Prize for Excellence Graduate Studies in Chemistry
This prize honours the contributions made by Professor Douglas Ryan to Dalhousie University and to analytical chemistry. It is awarded on the basis of merit for work carried out in the graduate program in Chemistry at Dalhousie University, including class work, research, the preliminary oral examination and demonstrating duties.

Anna Wilson Scholarship in Chemistry
An endowment has been established to award a scholarship to a female graduate student studying for the MSc or PhD degree in Chemistry at Dalhousie University. The Scholarship commemorates the distinguished career of Anna Wilson (BSc '27, MSc '28), a long-time employee of Merck in Montreal and a founding member of the Canadian Institute of Food Science and Technology.

4. Economics

Robert L. Comeau Scholarship
This scholarship honours the memory of Dr. Robert L. Comeau by providing scholarships to one or more students studying in the Department of Economics. Dr. Comeau was a member of Dalhousie's Economics Department for 27 years, retiring in 1990. He served as Chair from 1978 to 1983. He was a dedicated teacher and had long-standing concern for the financial need for students. Applicants must have attained a first-class standing in their University Economics studies to date. The financial need to applicants will be taken into consideration by the Selection Committee. Applicants may be either graduate or undergraduate students. Undergraduate students must be in their third or fourth year of study during the period of the scholarship. Students may apply directly by submitting a signed letter to the chairperson of the Economics Department or may be nominated by the Undergraduate Coordinator or Graduate Coordinate in the Department. The application deadline is January 15.

Professor George A.B. Kartsaklis Memorial Scholarship
Family, friends and colleagues of Professor Kartsaklis established this fund to provide financial assistance to one or more graduate students from Third World countries currently enrolled in the Department of Economics, Dalhousie University.

U.L.G. Rao Memorial Prize in Economics
Family, friends, former students and colleagues of the late Professor U.L. Gouranga Rao established the U.L.G. Rao Memorial Prize in Economics in his memory. Gouranga Rao was a member of Dalhousie's Department of Economics from 1968 to 2002. This annual prize will be awarded to the Master's student(s) in Economics with the highest GPA in the MA Core Classes.

5. Engineering

APENS Engineering Centennial Scholarship
Number and Value: One, $3000 (subject to annual review)
Tenure: Normally two years (may be extended to a third year).
Basis of Award: The scholarship is awarded on the basis of the applicant's academic achievement in the Bachelor of Engineering program at Dalhousie.
Eligibility: The candidate must be a Nova Scotian who has graduated with a Bachelor of Engineering from Dalhousie and who has been accepted into a graduate program in a field of engineering related to space technology.
Field of Study: Engineering
Selection: Selection is carried out by the Faculty of Engineering, Graduate Studies Committee.
Donor or Awarding Agency: The Association of Professional Engineers of Nova Scotia established this Scholarship as an on-going reminder and celebration of the 1887 to 1987 Centennial of Canadian Engineering.
Apply to: Associate Dean (Engineering), Graduate Studies and Research
Deadline: March 31.

The Dr. L.F. Kirkpatrick Scholarship
Number and Value: One/$1,000.
Tenure: One year.
Basis of Award: The award is based on the academic record of the applicant during the final two years of the undergraduate engineering curriculum at a recognised university. Preference will be given to a candidate with an interest in doing research in the power utility field.
Eligibility: Accepted as a full-time graduate student in engineering at Dalhousie.
Field of Study: Power Engineering.
Selection: Selection will be carried out by the Faculty of Engineering Graduate Studies Committee.
Donor or Awarding Agency: The Nova Scotia Power Inc. established this scholarship in 1982 in recognition of dedicated service rendered by Dr. L.F. Kirkpatrick as President of Nova Scotia Power Inc.

Apply to: Office of the Associate Dean (Engineering), Graduate Studies and Research.
Application Deadline: March 31.

The Dr. S.K. Malhotra Graduate Scholarship
Number and Value: One, $2,500. (Subject to annual review)
Tenure: One year.
Eligibility: Accepted in the Civil Engineering Graduate Program, Faculty of Engineering. The area of research carried out shall be in the field of Structural Engineering. First preference will be given to a student from India.
Selection: Selection is carried out by the Faculty of Engineering, Graduate Studies Committee.
Donor: The scholarship was established in memory of Dr. S.K. Malhotra, former Dean of Graduate Studies and Professor of Civil Engineering at TUNS from 1965 to 1990, by his family and friends.
Apply to: Office of the Associate Dean (Engineering), Graduate Studies and Research.
Application Deadline: March 31.

The Medjuck Scholarship in Energy Studies
Number and Value: One/approximately $1,000. (Subject to annual review)
Tenure: One year, may be renewed subject to satisfactory progress.
Basis of Award: The scholarship is awarded on the student's academic achievement.
Eligibility: Accepted in a recognised graduate program in the Faculty of Engineering with a research project in the area of Energy Studies.
Field of Study: Engineering.
Selection: Selection will be carried out by the Faculty of Engineering Graduate Studies Committee.
Donor or Awarding Agency: Scotia Energy Resources Limited, and affiliate of The Centennial Group of Companies Limited.
Apply to: Office of the Associate Dean (Engineering), Graduate Studies and Research.
Application Deadline: March 31.

G.G. Meyerhof Graduate Fellowship
Number and Value: One/approximately $4,000 per year. (Subject to annual review)
Tenure: One year; possibility of renewal subject to satisfactory performance.
Eligibility: Accepted in a graduate program in Civil Engineering in the Faculty of Engineering. Preference is given to Canadian citizens who are graduates in engineering of recognised Canadian Universities.
Field of Study: The subject of research carried out shall be in the field of Geotechnical Engineering.
Selection: Selection will be carried out by the Faculty of Engineering Graduate Studies Committee.
Donor or Awarding Agency: Board of Governors of Dalhousie.
Apply to: Office of the Associate Dean (Engineering), Graduate Studies and Research.
Application Deadline: March 31.

Exxon Mobil Canada Ltd. Post-Graduate Scholarship
Number and Value: One; $5,000
Tenure: One year
Basis of Award: The award is based primarily on the academic record of the applicant's undergraduate program. Preference will be given to Canadian citizens or landed immigrants.
Eligibility: Eligible for admission to a graduate program in the Faculty of Engineering leading to an advanced research degree.
Field of Study: Any field of study offered in the Faculty of Engineering.
Selection: Selection will be carried out by the Graduate Program Committee of the Faculty of Engineering.
Donor or Awarding Agency: Mobil Oil Canada
Apply to: The Office of the Associate Dean (Engineering), Graduate Studies and Research.
Application Deadline: March 31.

George C. Reid and Lucille M. Reid Scholarships
Number and Value: 5/$5,000 maximum each. (Subject to annual review)
Tenure: One year renewable.
Basis of Award: The Scholarships are open to students who are accepted into the graduate program in the Department of Mechanical Engineering. The field of study within Mechanical Engineering is not limited although the student must be registered in a research degree program. Preference will be given to new applicants for the MASc degree. The scholarship may be renewed based on satisfactory performance, one for the MASc degree and twice for the PhD degree.
Selection: The decision of the award will be made by the Associate Dean (Engineering), Graduate Studies and Research, based on recommendations from the Department of Mechanical Engineering.
Application Deadline: Consult Department.

Bruce and Dorothy Rosetti Engineering Research Scholarships
Number and Value: Varies/up to $6,000. (Subject to annual review)
Tenure: One year, may be renewed subject to satisfactory progress.
Basis of Award: The Scholarship is awarded on the basis of the student's academic achievement and on letters of reference. Normally a foreign student is not eligible for this scholarship during the first year of graduate study at the University. In the awarding of this Scholarship the level of other financial support for each applicant will be considered in order to ensure the broadest distribution of scholarship funds.
Eligibility: Accepted in a recognised graduate program in the Faculty of Engineering.
Field of Study: Engineering, Food Science.
Selection: Selection will be carried out by the Faculty of Engineering Graduate Studies Committee.
Donor or Awarding Agency: Bruce and Dorothy Rosetti Bequest.
Apply to: Office of the Associate Dean (Engineering), Graduate Studies and Research. Application Deadline: March 31.

6. English

The Malcolm Ross Award in Canadian Literature
Established to honour the late Malcolm Ross, founding editor of the New Canadian Library and long-time member of the Department of English, a prize of $200 to be awarded to an outstanding MA or PhD thesis on Canadian Literature. McClelland and Stewart have generously provided the funding to recognise Professor Ross's role in forwarding the study of Canadian literature.

The Malcolm Ross Graduate Scholarship in English
Established by his colleagues and friends in memory of Malcolm Ross, distinguished literary scholar and editor and long-time member of the English Department. A graduate scholarship in the amount of $1,500 to be awarded by the department's Graduate Committee to an outstanding student entering the M.A. program in English.

The James W. Tupper Graduate Fellowship in English
Two fellowships, of an annual value of approximately $5,500 each, are awarded by the English Department, on the recommendation of the Undergraduate Committee, to students selected on the criteria of the GPA of all English classes at the 2000 level and beyond and a clear indication that the student(s) will go on to do graduate work. The work must be done at a university approved by the faculty; it need not be held at Dalhousie. Students registered at both Dalhousie and King's are eligible.

7. Environmental Studies

The Gerald and Margaret Godsoe Scholarship
Established by the Godsoe family to support a highly qualified and motivated individual entering the Master of Environmental Studies (MES) program at Dalhousie. The recipient must hold an honours degree in natural or social sciences, engineering, architecture or its equivalent, with first-class standing in his/her course of study or have proof of exceptional merit. Further, the recipient must have made significant contributions through community service, leadership and education on environmental issues. Eligibility is limited to Canadian citizens and permanent residents of Canada living in the country. The recipient will be selected by the Admissions Committee at the School for Resource and Environmental Studies. Students wishing to be considered for this award must append a clearly marked, separate typewritten page to the admission application containing a brief description of activities and community involvement in environmental issues.

8. School of Information Management

Alumni Scholarship
Sponsored by the School's Associated Alumni. Awarded to one incoming student on the basis of academic excellence and evidence of a commitment to a career in librarianship. No application necessary.
Value: $2500

Barbara A.M. Patton Scholarship
Awarded to one incoming or returning student on the basis of academic merit (A- or better) and a demonstrated interest in international development, local community support, or law librarianship. To be considered for this award, please provide a statement (including references) demonstrating your interest in international development, local community support, or law librarianship.
Value: $2000

H. W. Wilson Foundation Award
Awarded to one incoming student on the basis of academic merit. No application necessary.
Value: $2000

9. Marine Affairs Program

The Douglas M. Johnston MASC Scholarship in Marine Affairs
This is an annual scholarship in the amount of $5,000 established by the Maritime Awards Society of Canada (MASC) for a Canadian citizen to pursue the Master of Marine Management (MMM) degree. The criteria for conferral of the scholarship include the following: applicants must be Canadian citizens; must demonstrate superior academic records; and may undergo a financial needs assessment. Qualified applicants to the MMM are automatically considered for this scholarship upon completion of their application; no separate application is necessary.

Master of Marine Management Gold Award
The award is named in honour of Dr. Edgar Gold, CM, QC, one of the founders of the Dalhousie Ocean Studies program. An annual financial award is presented to the most deserving MMM graduates at the end of each academic year in October. The candidates will be identified within the annual peer group of MMM graduates according to academic performance and overall ability to reflect the ideal graduate as the "honest broker" - i.e. one who is mindful of the complementary and competing multi- and inter-disciplinary interests which influence the design, implementation, and outcome of the management process in marine affairs.The Gold Award recipient is the student who best exemplifies MAP's objectives with the knowledge, skills and attitudes necessary to be a leader in the field of Marine Affairs. Students must have met all requirements to graduate by September 1 of each year in order to be eligible for award consideration.

10. Mathematics and Statistics

The Professor Michael Edelstein Memorial Graduate Prize
Dr. Edelstein was an outstanding Professor in the Department of Mathematics and Statistics from 1964 to 1982. He was instrumental in the transformation of the department to the research department it is now, with a strong graduate component. A fund was established by his family to provide an annual prize to be awarded to a graduate student who shows great promise in the mathematical sciences. In order to encourage mathematical talent in both genders, the prize will alternate between male and female recipients.

Heller-Smith Foundation Graduate Scholarship in Mathematics & Statistics
The Scholarship was established to provide financial support and recognition to a graduate student. This scholarship will be awarded annually on the basis of academic achievement as determined by the faculty committee in the department of Mathematics and Statistics.

The Patrick F. Lett Graduate Student Assistance Bursary in Mathematics and Statistics
This bursary is to aid graduate students who are having difficulties getting sufficient assistance from other sources. Students must demonstrate financial need in conjunction with supportive information from their supervisor or the Chair of the Department.

11. Medical Sciences

Michael Mezei Memorial Scholarship
This scholarship was established in 2000 by the family, friends and colleagues of the late Dr. Michael Mezei. The scholarship is awarded to a qualified university graduate who is enrolled in a graduate program in medical sciences or other science programs at Dalhousie University. The recipient must demonstrate on interest in laboratory-based research and its translation toward clinical care. Preference will be given to research dealing with drug targeting and drug delivery systems and to graduates of the College of Pharmacy.

12. Nursing

Alexandra Hirth Award for Excellence in Nursing Research
This award was established in memory of and in recognition of Alexandra Hirth's commitment to excellence. The award will provide financial support for students in the thesis stream of the Master of Nursing program. The annual award will be made to an outstanding student whose thesis has the potential to contribute to the development of nursing knowledge and whose research is focused on issues related to individuals or families living with chronic illness. Deadline for applications is May 31.

Electa MacLennan Memorial Scholarship
The scholarship pays tribute to Dr. MacLennan's outstanding contribution to nursing education. Applicants must be a graduate of the School of Nursing, Dalhousie University baccalaureate or Master's program, have a grade point average of 3.66 or greater, clearly state her/his career and educational goals and how the particular program will contribute to their development, be accepted as a full-time student or have completed 3 full credits in a recognised School of Nursing, and demonstrate potential for or show active involvement in advancing the nursing profession in Canada. Deadline for application is May 31st. Information is available from the School of Nursing.

Katherine and Robert MacDonald Scholarship
The scholarship is intended to provide financial assistance to a student who is studying in a non-thesis option of the Master of Nursing program at Dalhousie University and who has demonstrated excellence in clinical nursing practice at the end of the first year of study. The applicant must have a grade point average of 3.6 or greater, have completed a minimum of one credit of nursing clinical classes and demonstrated excellence in nursing practice, and must supply a statement of career goals explaining how the selected graduate program will contribute to excellence in clinical nursing practice. Deadline for application is May 31st. Information is available from the School of Nursing.

Margaret Cragg Award
This award was established by the family and friends in honour of Margaret M. Cragg, who pioneered the movement against violence toward women and in the practice of preventative interdisciplinary health care. An annual financial award is made available to a graduate student in Nursing. Further information is available from the School of Nursing.

Margaret Inglis Hagerman Graduate Scholarship in Nursing
The scholarship is awarded annually to a Master of Nursing student at Dalhousie University who has demonstrated leadership.

Dr R.M. MacDonald Scholarship
The scholarship pays tribute to Dr. MacDonald's concern to prepare students for the nurse practitioner role. The scholarship is awarded annually to one or more students entering the nurse practitioner stream.

Ruth May Award
The scholarship recognizes Dr. May's commitment to the education of outpost nurses and nurse practitioners. The award is given annually to one or more nursing students in the nurse practitioner stream in recognition of clinical excellence and professional growth.

School of Nursing MN Scholarship
One or more annual scholarships are awarded to students entering, for part-time study, the Master of Nursing program at Dalhousie University. Applicants must have a minimum grade point average of 3.66 and submit an application letter outlining the contribution they can make to nursing and health care as an outcome of graduate study in nursing.

School of Nursing PhD Scholarship
The scholarship is awarded annually to one or more full-time students enrolled in the PhD (Nursing) program who demonstrates potential for and/or shows active involvement in advancing the nursing profession in Canada.

Helen Watson Memorial Scholarship
The scholarship is awarded annually to a full-time student enrolled in the PhD in Nursing program who demonstrates potential for or shows active involvement in advancing the nursing profession in Canada. Applicants must normally have a grade point average of 3.66 in their previous work (baccalaureate or masters). Their letter of application will outline their contribution to nursing leadership and how their research will improve health outcomes and influence health and social policy.

13. Occupational Therapy

Dr. Gustave Gingras Award (Post-Professional Award)
This award was established to honour and acknowledge in perpetuity the work of Dr. Gustave Gingras, world renowned physician, rehabilitation specialist, and humanitarian. This award will be awarded to a student in the Post-Professional Master of Science program at Dalhousie University who wishes to conduct thesis research on an international topic.

Barbara O'Shea Graduate Award (Post-Professional Award)
This award was established in recognition of contributions made by Barbara O'Shea to the School of Occupational Therapy as founding director and to the profession of occupational therapy. This award will be awarded to one or two full time or part-time students entering the first year of the Post-Professional Master of Science program at Dalhousie University. Selection will be based on the student's scholarly achievement to date and on a combination of contribution to the profession and potential for graduate studies (evidence taken from the Letter of Intent). In selecting, preference will be given to graduates of the Bachelor of Science (Occupational Therapy) program, Dalhousie University.

School of Occupational Therapy Graduate Scholarships (MSc OT Entry Level and Post-Professional Awards)
This scholarship supports full or part-time students who are entering the School's Master of Science program. Selection will be based on the student's scholarly achievement to date and is decided by the Committee of the Whole, School of Occupational Therapy, or a sub-committee of selected faculty. One or more scholarships of approximately $250 each are offered annually.

14. Oceanography

The Kathy Ellis Memorial Book Prize
This prize was established through the support of Kathy's friends and colleagues who expressed the wish she be remembered and agreed that a fitting manner would be through the award of an annual book prize in Oceanography, given in her name. Kathy had a deep commitment to the principles of high quality scientific research and the communication of this knowledge to students and professionals in developing nations. This prize is presented annually to the Department of Oceanography graduate student, in their first year, who achieves the highest average in the Oceanography core courses.

The Professor F. Ronald Hayes International Scholarship
This scholarship fund was established in memory of Professor F. Ronald Hayes, founder and first director of the Institute of Oceanography of Dalhousie University, and in commemoration of the Joint Oceanographic Assembly which was held at Dalhousie during August, 1982. The purpose of the scholarship is to provide financial support for a new graduate student in the first year of a MSc or a PhD program in the Department of Oceanography. The recipient must be from a developing country ("developing country" shall be defined as one belonging to the United Nations Group of 77), from a state of the former Soviet Union, or from an economically disadvantaged country such as: Albania, Bulgaria, Romania and the former Yugoslavia. The recipient will be nominated through the normal screening process by the Departmental Graduate Admission Committee. For further information contact the Department of Oceanography.

15. Oral and Maxillofacial Surgery

John P. Laba Memorial Research Award
The income earned from a fund established in memory of John P. Laba by family, friends, patients and colleagues, will provide for this award which may be given annually. The recipient will be the dentist accepted in the Graduate Program in Oral and Maxillofacial Surgery and will be given exclusively for the presentation, dissemination and/ or publication of research related to Oral and Maxillofacial Surgery. For further information please contact the Department of Oral and Maxillofacial Surgery.

16. Philosophy

The Douglas Butler Memorial Prize
The Butler Memorial fund was established in memory of Dr. Douglas Butler, a good friend of the Philosophy Department who had taught Summer Session classes with us, and who died suddenly in Halifax in 1991 at the age of 34. The prize is awarded annually for the best graduate student term paper.

17. School of Physiotherapy
All prizes and awards given by the School of Physiotherapy are awarded at Convocation.

Canadian Physiotherapy Association Award
A certificate and first-year membership in the Canadian Physiotherapy Association constitute this annual award. It is presented to the graduating student who has achieved the highest cumulative GPA in academic and clinical physiotherapy subjects during the program.

Canadian Physiotherapy Cardio-Respiratory/CPA Student Excellence Award
This award is given at convocation in recognition of outstanding achievement in cardio-respiratory physiotherapy.

Ken Hill Electrotherapy Award
This award, established by the ERD Group, is in honour of Mr. Ken Hill, retired Professor of Dalhousie University and who also received an Honourary Doctorate from the University in 2002. The award is given to the member of the graduating class who demonstrates excellence in electrotherapy.

Morris B. Kohler Award in Physiotherapy
This prize is awarded to the student who has demonstrated the greatest interest in the treatment of long-term rehabilitation patients, while attending the Nova Scotia Rehabilitation Centre.

Hazel Lloyd Memorial Prize
The Hazel Lloyd Foundation was established by Miss Aphra Lloyd in memory of her sister, Miss Hazel A. Lloyd (1930-1985), Associate Professor, School of Physiotherapy. Friends, associates and alumni have made additional contributions. The purpose is to foster interest in geriatrics and gerontology, Professor Lloyd's major areas of interest. The Foundation awards an annual Prize to the student demonstrating excellence in Gerontology and Geriatrics.

Jean McAloney Memorial Prize
This prize is awarded annually to the student in the graduating class who has demonstrated the highest clinical standing. The prize is sponsored by the College of Physiotherapists of New Brunswick.

Donna Myers Memorial Award
This award is given by the Nova Scotia Branch of the Canadian Physiotherapy Association in memory of Donna Myers, one of the founding members of the Physiotherapy Professional Association of Nova Scotia. This award is presented to the student who exemplifies dedication

and professionalism by achieving the greatest improvement in overall academic standing who consistently demonstrates professionalism and enthusiasm for physiotherapy.

New Brunswick Student Professionalism Award
This award was established to recognize the graduating student who exemplifies professional behaviour and attitude within the academic and clinical settings.

Newfoundland and Labrador College of Physiotherapy Prize
This prize is given to the student in the graduating class who has attained the highest academic standing in Musculoskeletal studies.

Newfoundland and Labrador Physiotherapy Association Prize
This prize is awarded to the member of the graduating class who has attained the highest standing in Neuroscience studies. It is sponsored by the Newfoundland and Labrador Physiotherapy Association.

Nova Scotia College of Physiotherapists Prize
This is an annual award given to a graduating student who has demonstrated the greatest degree of leadership within their class. The recipient is chosen by his/her classmates by secret ballot.

Nova Scotia Section of Orthopedic Division, CPA Award
Established by the Nova Scotia Section of the Orthopedic Division of CPA, this annual award is given to the student in the graduating class with the best overall achievement in all Orthopedics / Musculo-Skeletal components of the Physiotherapy Program. The recipient of this award has demonstrated a consistently high skill level in the practical and clinical components of musculo-skeletal physiotherapy.

Parkinson Society of Canada, Maritime Region Award
To the student in the graduating class who made the greatest contribution to health in Parkinson disease.

Prince Edward Island Physiotherapy Association Prize
This prize is awarded annually to the student of the graduating class who has the highest academic standing in Gross Anatomy.

School of Physiotherapy Paediatric Prize
This award is given by the School of Physiotherapy to recognize a graduating student who has shown a keen interest in paediatric physiotherapy. The recipient will be chosen based on both academic and practical excellence in the paediatric portions of the physiotherapy program.

The Patricia Stanfield Covert Award in Physiotherapy
An endowment has been established to provide an annual prize to a physiotherapy student who is entering the final year of the program. The recipient is to be nominated by classmates on the basis of extra curricular activities, interpersonal skills and scholarship proficiency.

Unsung Hero Award
This award is given to the graduating student who has generously contributed her/his time and efforts to School activities and had demonstrated a positive and enthusiastic school spirit.

18. Physics

The William Leiper Memorial Scholarship
Dr. Leiper was an outstanding Professor in the Department of Physics from 1968 until his death in 1980. An endowment was established from funds donated by family, colleagues and friends of Dr. Leiper after his death to provide an annual scholarship to a student(s) with special ability pursuing a graduate degree in Physics. The scholarship is awarded at the discretion of the Physics and Atmospheric Science Department and is normally granted to a student already engaged in graduate studies at Dalhousie. The scholarship amount is to a maximum of $500.

The James Gordon MacGregor Memorial Teaching Fellowship in Physics
Relatives of the late Dr. J. G. MacGregor contributed to the James Gordon MacGregor Memorial Fund to provide awards to both undergraduate and graduate students in the study of physics. The graduate fellowships are offered to candidates pursuing a Master's or Doctoral degree in Physics. The holder of this fellowship is expected to provide instruction to undergraduate students during the academic session. The fellowships will be awarded at the discretion of the Physics and Atmospheric Science Department. Application is not required.

The Dr. A. Stanley MacKenzie Teaching Fellowship in Physics
This fellowship was established in memory of Dr. A. Stanley MacKenzie, who was a Professor of Physics from 1905 to 1910 and President of Dalhousie University from 1911 to 1931. The annual fellowship is offered to a candidate pursuing a Master's or Doctoral degree in Physics who shows special ability in providing instruction to undergraduate students during the academic session. The fellowship will be awarded at the discretion of the Physics and Atmospheric Science Department. Application is not required.

19. Planning

Atlantic Planners Institute Student Award
Field of Study: Planning.
Eligibility: A full-time student in his/her graduating year in a planning school accredited by the Canadian Institute of Planners in the Atlantic Provinces.
Number and Value: One, a trophy or plaque engraved with the recipient's name, supplemented by a cash award of $500.
Tenure: One year.
Basis of Award: Academic achievement and contribution to planning in the community.
Donor or Awarding Agency: Atlantic Planners Institute.
Selection: Atlantic Planners Institute
Application: Each eligible planning school should submit a recommendation for the student it believes is most deserving of the award.
Deadline: April 15, unless otherwise determined by API Council.

Canadian Institute of Planners Student Award for Academic Excellence
Field of Study: Planning
Eligibility: A full-time student member of the Canadian Institute of Planners.
Number and Value: One, a certificate bearing the CIP seal and a book prize.
Basis of Award: The award is made to the student who has achieved the highest academic standing over the length of the MPlan program.
Donor or Awarding Agency: Canadian Institute of Planners.
Selection: School of Planning
Application: Application is not required.

Canadian Institute of Planners Student Scholarships (4)
Value: $2,000 to $4,000.
Basis: Will be awarded annually in recognition of a thesis, practicum, or major research paper which may be proposed or in progress.
Eligibility: An individual may apply to the Canadian Institute of Planners. Applicant must be a student member in good standing with the CIP and must be enrolled full-time in a recognised planning program.
Field of Study: Planning.
Selection: Submission will be judged on the basis of its potential contribution to the planning profession (in theory or practice) or its potential service to a community or a community group.
Apply to: Application forms may be obtained from the School of Planning and must be received in the CIP national office by the date specified on the application form.

Dorothy Leslie Prize
This prize, named after the former secretary of the School of Planning, is awarded to a student finishing the first year of the Masters program who has made a significant contribution to the life of the School.

The Master of Planning Prize
This is a book prize given to a graduating student on the basis of academic excellence as well as a demonstrated commitment to community planning.

Nova Scotia Planning Directors Association Award (NSPDA)
Nova Scotia Planning Directors Association Award is given to a student of Planning who has demonstrated academic excellence and leadership. Value $500, awarded annually in April. Selection: School of Planning Faculty.

Bruce and Dorothy Rosetti Scholarships
Field of Study: Architecture or Planning.
Eligibility: Students registered in the Master of Planning program or the Master of Architecture (Post-Professional) program.
Number and Value: One or more, $6,000 total (subject to annual review).
Basis of Award: To assist students in carrying out their programs of study. Awards will be given on the basis of academic excellence.
Donor or Awarding Agency: Estate of Bruce and Dorothy Rosetti.
Selection: Faculty of Architecture and Planning.
Application: Apply to School of Planning.
Application Deadline: April 15.

School of Planning Achievement in Planning Studies Award
This prize is awarded in recognition of academic excellence upon completing the first year of the Master of Planning degree program.

The School of Planning Prize
The School of Planning awards a book prize to a student who has achieved academic excellence in the program and contributed to the life of the school.

The School of Planning Project Prize
The School of Planning Project Prize is awarded to the graduate who has produced the best individual project.

School of Planning Team Project Prize
The prize is awarded to graduating students in the team completing the most outstanding senior team project.

Walter Gardner Stanfield Scholarships
Field of Study: Architecture or Planning.
Eligibility: Students entering the first term of a graduate program in the Faculty of Architecture and Planning.
Number and Value: One or more, $2,000 total.
Basis of Award: Applicants will be expected to have demonstrated, in the quality of work submitted in support of their application, both academic excellence and outstanding preparedness for the program to be undertaken in the Faculty.
Donor or Awarding Agency: Estate of Walter Gardner Stanfield.
Selection: Faculty of Architecture and Planning. Selection will be made by the appropriate admissions committee. All applications for graduate study received by the first day of the summer term prior to entering the program will be considered automatically.
Application: Application not required.

20. Psychology

The Beatrice Award
The Beatrice Award will be awarded annually to the graduate student in the Clinical Psychology PhD Program who is deemed to have been the "best citizen" and the most positively helpful or supportive to fellow students (graduate or undergraduate) during their time in the Program. The award will be decided on by a committee of students and others chosen and headed by the Clinical Program Co-ordinator. The award is to honour the outstanding contributions of Beatrice Hanisch to the Clinical Psychology PhD Program since its inception in 1989.

The Dr. Mabel E. Goudge Scholarship in Psychology
In her Will, the late Dr. Mabel Goudge bequeathed a sum of money to endow a scholarship for the most outstanding woman graduate student in experimental or clinical psychology.

The D.O. Hebb Post-Graduate Prize
To honour the memory of Donald Olding Hebb (BA 1925), Professor Emeritus (1977-1985), the Psychology Department established the D.O. Hebb Post-Graduate Prize (valued at $1,000), which is awarded by the Graduate Program Committee, to an entering Masters and/or PhD student who has demonstrated the best potential to make a significant scientific contribution to the field of psychology.

21. Social Work

Check the website for more detailed information: http://socialwork.dal.ca

Association of Black Social Workers of Canada Bursary.
To assist full and part time African Canadian students who are attending the Dalhousie School of Social Work and who are studying towards a social work degree.

Calvin Ruck Scholarship
This scholarship is for BSW and MSW African Nova Scotian students who have demonstrated a desire to improve the social conditions and further the interests of African Nova Scotian/Canadian people and their communities through the study and practice of Social Work. Careful consideration will be given to the purposes and vision of NSAACP and to the qualities of courage, generosity, persistence, and leadership that characterizes Dr. Ruck's life and work.

Hanna G. Matheson Bursaries
These bursaries are available to students enrolled in the BSW or MSW degree programs on the basis of need. The fund is administered by the Registrar's Office, from which application forms are available.

The Lawrence T. Hancock Scholarship
The Hancock Scholarship was established to honour Dr. Lawrence T. Hancock for his devoted work as the first full time director of the Maritime School of Social Work, 1949 to 1973, and for his service to the profession and community. The scholarship is awarded annually to a student in the Master of Social Work program who has demonstrated a high level of academic achievement and a potential for leadership in the field of social work. Letter of application are to be submitted by October 15th.

Margaret Cragg Award
This award was established by family and friends in honour of Margaret M. Cragg, who pioneered the movement against violence toward women and in the practice of preventative, interdisciplinary health care. An annual financial award is made available to a graduate student in Social Work. Letters of application are to be submitted by October 15th.

Raoul Leger Memorial Humanitarian Award
This award was established to honour the memory of Raoul Leger, who received a Master's degree in Social Work from Dalhousie University in 1977. His work at home and abroad exemplified his commitment to community development, peace and social justice. The award presented to a graduating BSW or MSW student, who is **nominated** on the basis of achievement with a continued involvement in critical social issues.

Sonja R. Weil Memorial Bursary
Family and friends established this endowment in memory of Sonja Weil and in tribute to her work as a social worker and psychotherapist. This bursary is open to students in the BSW and MSW programs, although first priority is given to graduate students who demonstrate financial need, satisfactory academic standing and interest in those areas which most closely reflect Sonja Weil's work in child and family therapy. Letters of application are to be submitted by October 15th.

The School of Social Work MSW Alumni Award
This Alumni award has been established to support financial awards to be given to students in the Master of Social Work degree program who demonstrate the highest values of humanity, community, and service in the study of Social Work as reflected in contributions to the learning environment of the School. This award is open to distance and campus students. A student must be **nominated** for this award.

II. University Awards

The Irving and Jeanne Glovin Award
The Oskar Schindler Humanities Foundation established this award in 2003 to support research into the meaning and principles underlying "good human conduct". The research submitted will seek to define the meaning of "good human conduct" with which all persons could agree, to explore its sources, and develop pragmatic educational strategies and ways of teaching children, to show by action, respect and acceptance of others of any circumstances and/or background. The Irving and Jeanne Glovin Award will enable collaborative research by students, in the final

year of undergraduate study or graduate study, in any major discipline or interdisciplinary program, together with a professor or mentor. The recipient will be preferably one who has a broad general education and interdisciplinary interests appropriate to the research topic chosen. A copy of the research essay, accompanied by a letter of recommendation from the faculty member, must be submitted by April 15th each year to the Dean of Faculty of Arts and Social Sciences, or the Dean of Graduate Studies. The recipient will be asked to present the research essay.

III. Bursaries

A. General Information about Bursaries

Canada Student Loans (with or without provincial bursaries and/or loans) are expected, by provincial authorities, to meet the financial deficiencies of the students. Bursaries subsequently awarded by the University must be reported and are liable to be deducted (in part or in whole) from the amounts originally allocated under the Canada Student Loan Plan or provincial aid program.

B. Government Notification

Holders of Dalhousie University bursaries should note that the University is required, upon written request, to report its award winners to the respective Provincial Student Aid Authority.

C. Faculty of Graduate Studies Bursaries

Students may apply to the Faculty of Graduate Studies for university bursaries made available through Dalhousie's Student Assistance Program. Bursary awards are based on eligibility and need. They are normally meant to help students overcome temporary financial emergencies such as medical costs or other unforeseen expenses. In exceptional circumstances a Faculty of Graduate Studies Bursary may be awarded for a chronic shortfall in the student's annual budget, and then only for students beyond their first year of graduate study at Dalhousie University who do not receive full scholarship support as defined by Faculty of Graduate Studies for Master's or PhD programs.

Students must be registered in order to receive a bursary. Students eligible for government loans must have applied for such loans and provide evidence of the assessment before a bursary application can be considered.

Bursary applications from international graduate students (students who are not Canadian citizens or landed immigrants) are not considered by the FGS Bursary Committee but must apply through the office of International Student and Exchange Services.

Bursary applications are considered monthly throughout the year by the Faculty of Graduate Studies Graduate Bursary Committee (section II.4.5.7). Awards are for a maximum of $600, lower amounts may be awarded. Normally students cannot receive more than one bursary award in an academic year. Decisions of the Bursary Committee are not subject to appeal.

The total available for bursaries in a given year depends on the amount available through the Student Assistance Program of the office of the Vice-President Student Services.

D. Other Bursaries

The John and Lina Graham Commonwealth Bursary
The donors established this fund to mark the 75th anniversary in 1988 of the Association of Commonwealth Universities. It is used to assist graduate students who find themselves in need of financial aid while in Nova Scotia. Recipients will be residents of Commonwealth countries, other than Canada, who in the opinion of the selecting body demonstrate need. Contact the Faculty of Graduate Studies office for further information.

The Dr. P. Anthony Johnstone Memorial Bursary
The donors established this fund in 1994 to honour the memory of Dr. P. Anthony (Tony) Johnstone (1931-1989), scholar, educator and Director of the Nova Scotia Human Rights Commission, 1985-1989. It is used to assist a humanities or social science graduate student who has a record of interest and involvement in social justice and human rights. Contact the Faculty of Graduate Studies office for further information.

IV. Teaching Assistantships

Most departments offer Teaching Assistantships. The number, amounts and conditions vary. Enquiries should be directed to the department or school.

The President's Graduate Teaching Assistant Awards
Dalhousie University recognises and applauds the important contributions of Graduate Teaching Assistants to the educational mission of the University. The work of TAs, in the classrooms, laboratories and behind the scenes, provides crucial support for faculty members and greatly enhances the learning process for undergraduate students. Each year, the President's Graduate Teaching Assistant Awards are presented to those TAs who have achieved outstanding success in the area of undergraduate instruction.

Nominations are accepted at the Centre for Learning and Teaching. The winners are chosen in the Spring of each year.

V. Research and Travel Grants

A. Research Grants

Research grants to assist thesis research are available for graduate students in disciplines where such funding would not be available through the research grant(s) of their supervisor or through external grants or awards to the student. In most cases this will be for minor research expenses in disciplines covered by the mandate of the Social Sciences and Humanities Research Council (SSHRC). Students in other disciplines may also apply to the Faculty of Graduate Studies for research grants but in all cases Faculty of Graduate Studies grants can be awarded only when the student has not secured external funding, the supervisor does not have research grant support and no funding is available from the department.

Guidelines and application forms are available on the Faculty of Graduate Studies website at www.dalgrad.dal.ca/forms/student/#research. If applicable, students must secure Ethics approval for their research. Further information is available from the Office of Research Ethics Administration Website at www.dal.ca/~research/research_1482.html. Students may simultaneously apply for a research grant and ethics approval; however, funds will not be approved until Ethics Approval has been received. Research grants will be established under their supervisor's signing authority.

B. Conference Travel Grants

Conference travel grants can be awarded to graduate students in thesis programs. In order to be eligible, students must be presenting a poster or paper based on their current program thesis research at a scholarly meeting or conference.

A letter of acceptance from the conference organizers, or a copy of the conference program with registration cost must accompany the application. The letter of acceptance or conference program must include the name of the applicant, the title of the poster or paper to be presented, and the dates and location of the conference. Department approval must be given to applications.

Travel costs can be claimed only for travel from Halifax to and from the location of the conference, and must be based on the lowest available fares. For conferences held in Nova Scotia only registration costs can be claimed, travel costs and per diem costs are not eligible.

The maximum travel grant awarded is $750 and is subject to change without notice.

Applications must be received in the Faculty of Graduate Studies office a minimum of one month in advance of the conference. Applications will not be accepted retroactively or for a conference that occurs in the term following the completion of their degree requirements.

Students are eligible to apply for one travel grant during the period of their graduate degree program at Dalhousie.

Guidelines and application forms are available on the Faculty of Graduate Studies website at www.dalgrad.dal.ca/forms/student/#travel.

VI. Killam Postdoctoral Fellowships

Killam funds provide for postdoctoral fellowships in many fields of study. The annual stipend is $44,000 (2009) plus travel and research grants. There are no restrictions regarding nationality of applicants, but non-Canadian candidates must meet all Canadian Immigration requirements. Qualifying applicants should have recently completed a PhD degree at a recognised university and should not hold a permanent academic position to which they will return. Since these Fellowships are intended to attract new scholars to Dalhousie, scholars already at Dalhousie are not eligible to apply, including Dalhousie PhDs, Dalhousie or King's employees, and researchers in residence at Dalhousie or King's with external sources of funding. These awards may be taken up between May 1st and January 15th. Fellows may engage in limited teaching duties in the University. Completed applications and supporting documents must be submitted to the Department in which the applicant wishes to work, no later than December 15th. The results of the competition are usually announced in mid-February, and all applicants are notified of the results.

VII. Awards on Graduate Transcripts

A select number of scholarships and awards are recorded on the official Dalhousie transcript for graduate students. The list of such scholarships and awards is available from the Faculty of Graduate Studies.

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