



# Table of Contents

Academic Dates	1
Admission Dates 2001/2002	2
Definitions	3
Class Codes	4
Dalhousie University	5
Executive Officers	5
Academic Programmes	7
Academic Regulations	8
Registration	8
Class Withdrawal	8
University Regulations	9
General	9
Rescission of Acceptance into a Programme	9
Official Examination Regulations	9
Policy in Case a Formal Examination Cannot be Completed at the Regularly Scheduled Time	10
Retention of Student Work	10
Freedom of Information and Protection of Privacy	10
Release of Information About Students	10
Policy on Accessibility for Students with Disabilities	10
Procedures Regarding Students with Learning Disabilities	11
Intellectual Honesty	12
Discipline	12
Senate Discipline Committee	12
Code of Student Conduct	13
Guide to Responsible Computing	15
Faculty of Graduate Studies	17
Agriculture	32
Anatomy and Neurobiology	37
Architecture	40
Atmospheric Science	49
Biochemistry and Molecular Biology	50
Bioethics	53
Biological Engineering	53
Biology	55
Biomedical Engineering	60
Business Administration	63
Chemical Engineering	76
Chemistry	78
Civil Engineering	83
Classics	87
Community Health and Epidemiology	88
Computer Science	91
Earth Sciences	96
Economics (including Development Economics)	99
Education	104
Electrical and Computer Engineering	104
Electronic Commerce	108
Engineering	110
Engineering Mathematics	117
English	119
Environmental Studies	125
Food Science and Technology	130

French	132
German	136
Health and Human Performance	137
Health Education	138
Kinesiology	139
Leisure Studies	139
Health Services Administration	141
History	145
Human Communication Disorders	150
Industrial Engineering	153
Interdisciplinary PhD Programme	155
International Development Studies	156
Internetworking	158
Law	160
Library & Information Studies	163
Marine Affairs Programme	166
Mathematics and Statistics	168
Mathematics	169
Mechanical Engineering	171
Medical Sciences	175
Microbiology and Immunology	176
Mining and Metallurgical Engineering	179
Neuroscience	182
Nursing	184
Occupational Therapy	188
Oceanography	191
Oral and Maxillofacial Surgery	195
Pathology	197
Pharmacology	199
Pharmacy	201
Philosophy	202
Physics	205
Physiology and Biophysics	208
Physiotherapy	211
Political Science	212
Psychology	218
Public Administration	223
Social Work	232
Sociology and Social Anthropology	236
Statistics	239
Urban and Rural Planning	241
Women's Studies	245
Centres and Institutes	246
Resources and Services	251
Financial Aid	258
Fees	259
Residence Fees	263
Awards	265
Teaching Assistantships	271
Research and Travel Grants	272
Index	273
Awards Index	276
Campus Map	277

# Important Notices

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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 programme. Students should be aware that enrolment in many programmes is limited and that students who are admitted to programmes 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 programme in question. While the University will make every reasonable effort to offer classes as required within programmes, prospective students should note that admission to a degree or other programme 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 classes 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

The Dalhousie University calendars are available in electronic form on the World Wide Web. The primary access point is the Dalhousie University homepage at:

**[www.dal.ca](http://www.dal.ca)**

From the Dalhousie homepage, choose:

**Academics**

and then follow the appropriate navigation path.

## Other Programmes

Information on programmes offered in the Faculties of Architecture, Arts & Social Sciences, Computer Science, Engineering, Health Professions, Management and Science can be found in the Undergraduate calendar.

# Academic Dates

ACADEMIC CLASS ADD/DROP DATES (See Fees Section for Fee Due Dates)					
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	Last Day to Drop with "W"
<b>SUMMER TERM 2001</b>					
1	May 7 - August 3, 2001	May 14, 2001	May 14, 2001	June 1, 2001	June 30, 2001
A	May 7 - June 22, 2001	May 2, 2001	May 11, 2001	May 23, 2001	June 8, 2001
D	May 7 - May 30, 2001	May 2, 2001	May 11, 2001	May 14, 2001	May 23, 2001
9	June 4 - August 31, 2001	May 14, 2001	June 15, 2001	July 3, 2001	August 3, 2001
E	May 31 - June 22, 2001	May 14, 2001	June 6, 2001	June 7, 2001	June 15, 2001
B	July 3 - August 17, 2001	June 27, 2001	July 9, 2001	July 20, 2001	August 3, 2001
F	July 3 - July 25, 2001	June 27, 2001	July 9, 2001	July 10, 2001	July 18, 2001
G	July 26 - August 17, 2001	June 27, 2001	August 1, 2001	August 3, 2001	August 10, 2001
<b>FALL TERM 2001</b>					
X/Y	September 6, 2001 - April 9, 2002	August 31, 2001	September 21, 2001	November 5, 2001	February 4, 2002
1	September 6, 2001 - December 3, 2001	August 31, 2001	September 21, 2001	October 5, 2001	November 5, 2001
<b>WINTER TERM 2002</b>					
1	January 7 - April 9, 2002	January 21, 2002	January 21, 2002	February 4, 2002	March 8, 2002
<b>SUMMER TERM 2002</b>					
1	May 6 - August 2, 2002	May 13, 2002	May 13, 2002	May 31, 2002	June 28, 2002
A	May 6 - June 21, 2002	May 1, 2002	May 13, 2002	May 22, 2002	June 7, 2002
D	May 6 - May 29, 2002	May 1, 2002	May 13, 2002	May 13, 2002	May 22, 2002
9	June 3 - August 30, 2002	May 13, 2002	June 14, 2002	July 2, 2002	August 2, 2002
E	May 30 - June 21, 2002	May 13, 2002	June 6, 2002	June 7, 2002	June 14, 2002
B	July 2 - August 16, 2002	June 26, 2002	July 8, 2002	July 19, 2002	August 2, 2002
F	July 2 - July 24, 2002	June 26, 2002	July 8, 2002	July 9, 2002	July 17, 2002
G	July 25 - August 16, 2002	June 26, 2002	July 31, 2002	August 2, 2002	August 9, 2002

## 2001

### May

- 21 Victoria Day - University closed
- 22-26 Spring Convocations

### July

- 2 Canada Day - University closed
- 3 Last day to apply to graduate in October
- 27 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

- 6 Halifax/Dartmouth Natal Day - University closed
- 24 Last day for those expecting Masters degrees in October to submit unbound theses to departments
- 17 Last day to have Leave of Absence approved by Graduate Studies for September

### September

- 3 Labour Day - University closed
- 6 Classes begin, Library and Information Studies

- 5 Orientation begins, Human Communication Disorders (first year)
- 6 Classes begin, unless otherwise specified, Regular session
- 14 Last day for those expecting to receive graduate degrees in October to submit approved unbound copies of theses to Faculty of Graduate Studies

### October

- 8 Thanksgiving Day - University closed
- 20 Fall Convocation

### November

- 12 In lieu of Remembrance Day - University closed
- 16 Last day to apply for admission to winter term, Graduate Studies

### December

- 1 Last day to apply to graduate in May
- 3 Classes end Fall term
- 5 Examinations begin

## December

- 10 Last day to have Leave of Absence beginning in January approved by Graduate Studies
- 14 Last day to submit approved, unbound theses to Graduate Studies for those registered in the fall term only
- 15 Examinations end

## 2002

### January

- 1 New Year's Day - University closed
- 7 Classes resume

### February

- 1 Munro Day - University closed
- 15 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 departments
- 18 Study break begins
- 25 Classes resume

### March

- 13 Last day for those expecting Masters degrees in May to submit unbound theses to departments
- 29 Good Friday - University closed

### April

- 9 Classes end unless otherwise indicated
- 12 Last day for those expecting to receive graduate degrees in May to submit approved unbound copies of theses to Faculty of Graduate Studies  
Examinations begin
- 16 Last day to have Leave of Absence approved by Graduate Studies for May
- 27 Examinations end

### May

- 20 Victoria Day - University Closed
- 21-25 Spring Convocation

### July

- 1 Canada Day - University closed
- 2 Last day to apply to Graduate in October
- 26 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

- 5 Halifax/Dartmouth Natal Day - University closed
- 16 Last day to have Leave of Absence approved by Graduate Studies for September
- 23 Last day for those expecting Masters degrees in October to submit unbound theses to departments

# Admission Dates 2001/2002

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## Final Dates for Receipt of Applications for Admission

### Regular Session - September Start Date

Graduate Studies <sup>1,2</sup> (except as below)	June 1
Non-Canadian Students (Graduate Studies)	April 1
Law (Doctoral level)	January 1
Environmental Studies	February 1
Social Work	December 1
Community Health & Epidemiology, Human Communication Disorders	March 1
Community Health & Epidemiology (non-Canadian)	January 1
Nursing	April 1
Health Services Admin. and Law (Master's level)	June 1
Oral and Maxillofacial Surgery <sup>3</sup>	June 1

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**.

3 Of year preceding commencement of programme

### Admission in January or May

Some programmes allow for a student to start either January 1 or May 1. Check the detailed programme descriptions or with the department directly to see if such start dates are permitted. See Faculty Regulation 3.2, pg. 19 for appropriate application deadlines.

General Application Deadlines	Canadian Applicants	Non-Canadian Applicants*
For September Admission	June 1	April 1
For January Admission	November 15	August 31
For May Admission	February 28	December 31

# Definitions

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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 programme due to unsatisfactory academic performance.

## Academic Programme

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

## Academic sessions

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

## 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 programme fee requirements but have yet to complete all their degree requirements. See Faculty of Graduate Studies Regulation 4.8, pg. 22.

## Co-operative Education

A programme 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 credit.

## CRN (Class Registration Number)

Each class has a CRN attached to it (class registration number) This number is to be used when signing up for classes.

## 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 full credit (six half-credit) classes or more, or the equivalent of 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 programme, or a graduate diploma programme.

## 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).

## Non-thesis Programme

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

## Part-Time Programme Fee Student - Graduate Studies

Those carrying not more than two and one-half (2½) full-credit classes during the 12 months, September to August or a student who has not yet completed the minimum number of years of part-time study required to complete the residency requirement for a particular degree programme.

## 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 on 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, p. 18 and 4.1, p. 20.

## Practicum

See Internship

## Prerequisite

Requirement which must be fulfilled prior to registering in a specific class.

## Programme Fees

The tuition fees charged to graduate students completing a degree. The programme fee is based on total tuition for a specified number of years, varying according to academic programme. Students who have not completed their programme after the specified number of years are required to pay a continuing fee. Please refer to Faculty of Graduate Studies Regulation 4.1, p. 20.

## 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 sufficiently strong academic background in a particular discipline to be enrolled directly in a Master's programme.

## Required Withdrawal

A student's required withdrawal from a graduate programme due to unsatisfactory academic performance or failure to meet admission or programme conditions. See Faculty Regulation 4.2.4, pg. 21.

## Residency

The period of time that graduate students are expected to be on campus for fulfilment of their formal programme requirements. In some programmes, 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 programme but is taking graduate classes. Special students must satisfy normal admission requirements.

## Thesis Only Fees

See Continuing Fees.

## Thesis Programme

A Master's or Doctoral programme of study involving a major research component in the form of a written thesis. Some programmes 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 programmes. Work terms are usually of 13-16 weeks duration.

## Class Codes

### Numbers

1000-level classes are introductory undergraduate  
2000-4000 level classes are advanced undergraduate  
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:

AGRE - Agricultural Engineering  
AGRI - Agriculture  
ANAT - Anatomy & Neurobiology  
ARCH - Architecture  
ASSC - Arts and Social Sciences Interdisciplinary  
BIOC - Biochemistry  
BIOT - Bioethics  
BIOE - Biological Engineering  
BIOL - Biology

BMNG - Biomedical Engineering  
BUSI - Business Administration  
CANA - Canadian Studies  
CH&E - Community Health & Epidemiology  
CHEE - Chemical Engineering  
CHEM - Chemistry  
CIVL - Civil Engineering  
CLAS - Classics  
COMM - Commerce  
COMR - Comparative Religion  
CPST - Complimentary Studies  
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 Programme  
ENGI - Engineering  
ENGL - English  
ENGM - Engineering Math  
ENVI - Environmental Studies  
ERTH - Earth Sciences  
FOSC - Food Science & Technology  
FREN - French  
GERM - German  
HAHP - Health and Human Performance  
HEED - Health Education  
HESA - Health Services Administration  
HIST - History  
HLTH - Health Professions  
HSCE - Health Sciences  
HSTC - History of Science and Technology  
HUCD - Human Communication Disorders  
IDIS - Interdisciplinary Studies  
IENG - Industrial Engineering  
INTD - International Development Studies  
INWK - Engineering Internetworking  
KINE - Kinesiology  
KING - King's Foundation Year Programme  
LAWS - Law  
LEIS - Leisure Studies  
LIBS - Library & Information Studies  
MARA - Marine Affairs  
MATH - Mathematics  
MDLT - Medical Laboratory Technology  
MECH - Mechanical Engineering  
MEDI - Medicine  
METL - Metallurgical Engineering  
MGMT - Management

MICI - Microbiology & Immunology  
MINE - Mining Engineering  
MUSC - Music  
NESC - Neuroscience  
NUMT - Nuclear Medicine Technology  
NURS - Nursing  
OCCU - Occupational Therapy  
OCEA - Oceanography  
OMFS - Oral & Maxillofacial Surgery  
ORAL - Oral Surgery  
PATH - Pathology  
PHAC - Pharmacology  
PHAR - Pharmacy  
PHIL - Philosophy  
PHSE - Physical Education  
PHYC - Physics  
PHYL - Physiology  
PHYT - Physiotherapy  
PLAN - Urban and Rural Planning  
POLI - Political Science  
PSYO - Psychology  
PUAD - Public Administration  
RADT - Radiological Technology  
RECR - Recreation  
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 Programme  
WOST - Women's Studies

## Dalhousie University

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The influence of Nova Scotia's largest university is felt throughout Canada - and well beyond. Founded in 1818, Dalhousie University provides a wide range of programmes from the undergraduate to the doctoral level in a dozen Faculties. It offers more than 3,600 classes in over 182 undergraduate, graduate and professional degree programmes, as well as an extensive array of continuing education programmes. Dalhousie combines a tradition of excellence with learning for tomorrow. The university is proud of its excellent students and its loyal alumni, who play professional and community leadership roles across Canada and around the globe.

Dalhousie is located on a 79 acre campus in the heart of Halifax. Its 13,700 full and part-time students come from across the country and throughout the world. They benefit from personal education in an attractive environment, coupled with all the educational, cultural and recreational advantages of a major university. In addition to its teaching and research facilities, Dalhousie has a system of libraries, student residences of many kinds, an Arts Centre, an art gallery, a Student Union Building, athletic and recreational facilities and other facilities of many kinds. Major teaching hospitals, federal and provincial research laboratories and the provincial archives are all close at hand.

The amalgamation, in 1997, of Dalhousie University with the Technical University of Nova Scotia has created a dynamic new centre of advanced technical education and research in Nova Scotia. It continues the Technical University of Nova Scotia's tradition of leadership in education, research and technology transfer in 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. By agreement with Mount Saint Vincent University students have access to various classes and services. Co-operation in a number of academic programmes, in administrative services, and in use of library resources is provided for in working arrangements with Saint Mary's University and other institutions in Halifax. 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

Sam Scully, BA, Mlitt, PhD

##### Finance and Administration

Bryan Mason, BA

##### Student Services

Eric McKee, BA, MA

##### External

Dale Godsoe, BA, BEd, MEd, LLD (Hon)

##### Vice-President Research

Carl Breckenridge, BSc, MSc, PhD

**Assistant Vice-President, Personnel Services**

Michael Roughneen, CPIR, BA, MSc, FIPM

**Deans of Faculties****Architecture**

Thomas Emodi, BArch, MES, NSAA

**Arts and Social Sciences**

Binkley, M.E., BA, MA, PhD

**Computer Science**

Jacob Slonim, BSc, MSc, PhD

**Dentistry**

William MacInnis, DSc, DDS, MEd, F.I.C.D.

**Engineering**

William F. Caley, BSc, MSc, PhD

**Graduate Studies (Acting)**

John Rutherford, BA, MS, PhD

**Health Professions**

Lynn McIntyre, MD, MHSc, FRCPC(C)

**Law**

Dawn Russell, BA, LLB, LLM

**Management**

Abolhassan Jalilvand, BA, MA, PhD

**Medicine**

Noni MacDonald, BSc, MSc, MD, FRCPC

**Science**

Warwick Kimmins, BA, PhD

**Henson College of Public Affairs and Continuing Education (Acting)**

Andrew Cochrane, BPER, MBA

**College of Arts and Science, Provost**

Warwick Kimmins, BA, PhD

**Administrative Officers****University Secretary and Legal Counsel**

Brian Crocker, QC, BA, LLB

**University Librarian**

William Maes, AB, MA, MLS

**University Registrar**

Deanne Dennison, BA

**Coordinator of Policy Development**

Julia Eastman, BA, MA

**Executive Directors****Computer and Information Services**

John Sherwood, BSc, EP

**Instructional Development and Technology**

Alan Wright, BA, MA, PhD

**Office of Institutional Affairs**

Brian Christie, BSc, MA, Assistant to the President for Planning

**Directors****Alumni Relations**

Lynne Sheridan, BA

**Arts Centre**

Heather McGean, BA

**Athletics and Recreational Services and Dalplex**

Al Scott, BPEd, MSc(PEd)

**Capital Gifts**

William Straitton, C.F.R.E.

**Counselling and Psychological Services**

Judith Hayashi, BA, MA

**Gift Planning**

Charlotte Sutherland, BA, MEd

**Environmental Health and Safety**

William Louch, PhD

**Facilities Management**

William Lord, BAsC, PEng

**Financial Services**

Ian Nason, BComm

**Health Services**

Joyce Curtis, MD

**Housing and Conference and Ancillary Services**

Heather Sutherland, BSc, MEd

**Public Relations**

Ann Janega, BComm, LLB

**Student Resources**

Susan McIntyre, MPA

**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**

Sir Graham Day

**Chancellor Emeritus**

Rueben Cohen  
Ruth Goldbloom

**Officers**

Mr. James S. Cowan, Chair  
Mrs. Karen Cramm, Vice-Chair  
Mr. Colin Latham, Vice-Chair  
Mr. John C. Risley, Honourary Treasurer  
Mr. Murray Coolican, Honourary Secretary  
Mr. John Flemming  
Ms. Cathy MacNutt  
Dr. Tom D. Traves

**Members**

Ms. Elizabeth Beale  
Mr. Wesley Campbell  
Mr. Gerald A. Clarke  
Hon. Lorne Clarke  
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Mr. David Craig  
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Ms. Joanne Galarneau  
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Mr. Don Mills  
Ms. Ann Petley-Jones  
Dr. David Precious  
Mr. Robert Radchuck  
Mr. Ian Robson  
Mr. Phillip Saunders  
Dr. Alasdair Sinclair  
Mr. Peter Stuart  
Dr. Colin Stuttard  
Mr. Bruce Towler

**Secretary**

Mrs. Sharlene Drake

**Observer for Faculty Association**

Dr. Tom Faulkner

**Senate**

Senate consists of the President, Vice-President (Academic and Research), the University Librarian, Deans of Faculties, Dean of Henson College, forty-eight elected Faculty members, four students elected by the Dalhousie Student Union, a representative of the University of King's College and a representative of the Nova Scotia Agricultural College.

Senate is the academic governing body of the University. Subject to the general approval of the Senate, faculties are responsible for supervision of programmes of study, of teaching and research, and for recommending candidates for degrees, diplomas, and university prizes. In addition, it is responsible for student discipline academic appeals, and faculty appointments, tenure and promotion.

**Chair of Senate**

Colin Stuttard, BA, PhD

**Vice-Chair of Senate**

Dr. Mohamed El-Hawary, BEng, PhD

**Secretary of Senate**

Ruth Bleasdale, BA, MA, PhD

# Academic Programmes

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**Faculty of Graduate Studies**

- Master of Architecture (First Professional) - 2 years
- Master of Architecture (Post-Professional) - 1 year
- Master of Applied Science  
1 or 2 years with thesis: Biological Engineering, Biomedical Engineering, Chemical Engineering, Civil Engineering, Computer Science, Electrical and Computer Engineering, Industrial Engineering, Mechanical Engineering, Metallurgical Engineering, Mining Engineering
- Master of Arts  
1 or 2 years with thesis: Classics, Economics, English, French, German, Health Education, History, International Development Studies, Leisure Studies, Philosophy, Political Science, Psychology, Sociology and Social Anthropology, Women's Studies
- Master of Business Administration - 1 or 2 years
- Master of Business Administration (Financial Services)
- Master of Business Administration (Information Technology)
- Master of Business Administration with Bachelor of Laws - 4 years
- Master of Computer Science (1 or 2 year project or thesis stream)
- Master of Development Economics - 2 years
- Master of Engineering  
2 years: Biological, Biomedical, Chemical, Civil, Electrical, Fisheries, Industrial Mechanical, Metallurgical, Mining, Naval Architecture
- Master of Engineering in Internetworking
- Master of Environmental Studies - 1 or 2 years
- Master of Environmental Design Studies - 1 year
- Master of Health Services Administration - 2 years
- Master of Health Services Administration with Bachelor of Laws - 4 years
- Master of Health Services Administration with Master of Nursing - 3 years
- Master of Laws - 1 year
- Master of Library and Information Studies - 2 years
- Master of Library and Information Studies with Bachelor of Laws - 4 years
- Master of Marine Management - 1 year
- Master of Nursing - 2 years
- Master of Nursing with Master of Health Services Administration - 3 years
- Master of Public Administration - 1 or 2 years
- Master of Public Administration (Management)
- Master of Public Administration with Bachelor of Laws - 4 years
- Master of Science  
1 or 2 years with thesis in: Agriculture, Anatomy and Neurobiology, Atmospheric Science, Biochemistry, Biology, Chemistry, Community Health and Epidemiology, Computer Science, Earth Sciences, Engineering Mathematics, Food Science, Human Communication Disorders (3 years) (Audiology or Speech Pathology), Kinesiology, Mathematics, Microbiology and Immunology, Occupational Therapy, Oceanography, Pathology, Pharmacology, Physics, Physiology and Biophysics, Physiotherapy, Psychology, and Statistics, also Neuroscience (combined with Anatomy and Neurobiology, Biochemistry, Pharmacology, Physiology & Biophysics, and Psychology).
- Master of Social Work - 1 or 2 years
- Master of Urban and Rural Planning - 2 years
- Master of Engineering and Master of Urban and Rural Planning - 2 years
- Master of Applied Science and Master of Urban and Rural Planning - 2 years

- Master of Science with Doctor of Medicine  
6 years - Master of Science thesis in: Oral and Maxillofacial Surgery
- Graduate Diploma in Public Administration - 1 year
- Doctor of Philosophy  
2 or 3 years, with thesis in: Anatomy and Neurobiology, Atmospheric Science, Biochemistry, Biological Engineering, Biology, Chemical Engineering, Chemistry, Civil Engineering, Classics, Computer Science, Earth Sciences, Economics, Electrical and Computer Engineering, Engineering Mathematics, English, Food Science, French, History, Industrial Engineering, Interdisciplinary Studies, Mathematics, Mechanical Engineering, Metallurgical Engineering, Microbiology & Immunology, Mining Engineering, Oceanography, Pharmacology, Philosophy, Physics, Physiology & Biophysics, Political Science, Psychology, Sociology and Statistics, also Neuroscience (combined with Anatomy and Neurobiology, Biochemistry, Pharmacology, Physiology & Biophysics, and Psychology)
- Doctor of Philosophy with Doctor of Medicine  
7 years - Doctor of Philosophy with thesis in: Anatomy & Neurobiology, Biochemistry, Microbiology & Immunology, Pharmacology, and Physiology & Biophysics
- Doctor in the Science of Law - 2 years, with thesis

# Academic Regulations

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## Registration

Registration material for September 2000 will be sent to all eligible students 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 Office of the Registrar. 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

Nonattendance does not, in itself, constitute withdrawal.

Withdrawals are not effective until written notification is received at the Office of the Registrar.

# University Regulations

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## 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 programme 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.
5. Students who change their name while attending Dalhousie must provide proof of name change to the Registrar's Office.
6. Students taking classes in another Faculty as part of an affiliated class of study must conform to the regulations of that Faculty with respect to these classes. It should be noted, however, that regulations pertaining to the degree programme are those of the "home" Faculty.
7. 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.
8. Except for university purposes, transcripts, official, or unofficial, will be issued only on the request of the student 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.
9. Students withdrawing voluntarily from the University should consult the individual faculty regulations and the Fees section of this Calendar.
10. 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.
11. 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.
  12. 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 Programme

Dalhousie University reserves the right to rescind any acceptance of an applicant into a programme or to rescind an offer of admission of an applicant into a programme. 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 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 or papers 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 Case a Formal Examination Cannot be Completed at the Regularly Scheduled Time

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 the Sunday immediately following. Students will be informed by the Registrar of the time and place of the rewrite both on the website of the Registrar ([www.registrar.dal.ca](http://www.registrar.dal.ca)) and on the formal examination bulletin boards in the A&A building, main level (next to the Registrar's Office) and at the Student Service Centre on the Sexton Campus.
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 procedures 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 faculty 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 web site and/or examination bulletin boards 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.

## Retention of Student Work

### Faculties of Architecture and Engineering

All work executed by students as part of their academic programmes in the Faculties of Architecture 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 (FOI/POP) 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 FOI/POP 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:

1. **Disclosure to students of their own records**
  - (a) Students have the right to inspect their academic record. An employee of the Registrar's Office will be present during such an inspection.
  - (b) Students will, on submission of a signed request and payment of the appropriate fee, 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.
2. **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.
3. **Disclosure to Third Parties**
  - (a) 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 programme.
  - (b) 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.
  - (c) 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.
  - (d) Other than in the above situation, 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.
  - (e) 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.

## 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 programmes;
  - 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 programmes, 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 programme 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 programmes; 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:

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

## D. Appeals

Admission and programme 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 1:** 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

## Intellectual Honesty

A University should epitomize the quest for intellectual honesty. Failure to measure up to the quest for such a standard can result in an academic offence. The seniority of the student concerned, the presence of a dishonest intent, and other circumstances may all be relevant to the seriousness with which the matter is viewed.

### Examples of Academic Offences

#### 1. *Plagiarism or Self-Plagiarism*

Dalhousie University defines plagiarism as the presentation of the work of another author in such a way as to give one's reader reason to think it to be one's own. Plagiarism is a form of academic fraud.

Plagiarism is considered a serious academic offence which may lead to loss of credit, suspension or expulsion from the University, or even the revocation of a degree.

In its grossest form plagiarism includes the use of a paper purchased from a commercial research corporation, or prepared by any person other than the individual claiming to be the author.

Self-plagiarism is the submission of work by a person which is the same or substantially the same as work for which he or she has already received academic credit.

The University attaches great importance to the contribution of original thought to scholarship. It attaches equal importance to the correct attribution of authorities from which facts and opinions have been derived.

The proper use of footnotes and other methods of attribution varies from discipline to discipline. Failure to abide by the attribution standards of the discipline concerned in the preparation of essays, term papers and dissertations or theses may, in some cases, constitute plagiarism.

Students who are in any doubt about the proper forms of citation and attribution of authorities and 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.

#### 2. *Irregularities in the Presentation of Data from Experiments, Field Studies, etc.*

Academic research is predicated on the presentation of accurate and honestly derived data. 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 revocation of degrees, loss of credits or suspension or expulsion from the University.

Students who are in any doubt about the proper forms of citation and attribution of authorities and sources should discuss the matter in advance with the faculty member 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.

#### 4. *Irregularities in Admissions Procedures*

A person who gains admission or assists any other person in gaining admission by any irregular procedure, for example, by falsifying an academic record or by forging a letter of recommendation or by impersonating any other person, commits an academic offence and is liable to a penalty (see Senate Discipline Committee).

#### 5. *Irregularities in Evaluation Procedures*

A member of the University who attempts or who assists any other person in an attempt to obtain, by irregular procedures, academic standing in a class related to any degree, diploma or certificate programme, commits an academic offence and is liable to a penalty. Without limiting possible irregularities in evaluation procedures that may be considered by the Senate Discipline Committee, the following examples shall be considered irregular procedures:

- arranging for or availing oneself of the results of any personation at any examination or test, or,
- attempting to secure or accepting assistance from any other person at any examination or test, or,
- having in one's possession or using any unauthorized material during the time that one is writing any examination or test, or,
- without authorization procuring a copy of an examination, test or topic for an essay or paper, or,
- in the absence of any enabling statement by the Faculty member in charge of that class, submitting any thesis, essay, or paper for academic credit when one is not the sole author, or,
- without authorization submitting any thesis, essay or term paper that has been accepted in one class for academic credit in any other course in any degree, diploma or certificate programme.

## Discipline

- 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.
- 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 appropriate Dean or Director of Residence in consultation with the relevant Residence Council. Senate is charged with the authority to deal with cases of alleged academic offenses, see examples above, (as delegated to the Senate Discipline Committee), as well as with certain other offenses that are incompatible with constructive participation in an academic community.
- 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.
- 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.

## Senate Discipline Committee

### A. Composition

The Committee comprises six representatives of the faculty elected by Senate for staggered three-year terms, one of whom shall be the Chair (chosen annually by the Committee), and four representatives of the 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.

## B. 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 class of the disciplinary process involving him or her but prior to adjudication, has:
  - (i) been compelled to withdraw academically;
  - (ii) chosen to withdraw from the University prior to being disciplined; or
  - (iii) 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 Student-Discipline Officers 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 open 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 Research)

## C. Appeals

An appeal from the decisions of the Senate Discipline Committee may be made to the Senate on such grounds as it determines are appropriate.

Where a Faculty, such as Health Professions, wishes to dismiss a student for their unethical conduct or unsuitability for any health profession, there is no appeal to the Senate Discipline Committee. Instead, an appeal may be made to a Senate *ad-hoc* committee.

## D. 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:

- (i) 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;
- (ii) repeat of the assignment that triggered the discipline;
- (iii) a failing grade or mark or assessment in the piece of work triggering the discipline;
- (iv) failure of the class or seminar or programme;
- (v) failure of the academic year;
- (vi) suspension for an academic term or year (to a maximum suspension of three (3) academic years);
- (vii) expulsion from the University;
- (viii) loss of a current or continuing scholarship, or both, or loss of eligibility to receive or to maintain scholarships or prizes or bursaries; and

- (ix) removal from the Dean's List.

PLEASE NOTE: Transcripts will not be issued for a student while a Senate Discipline case is pending.

## Code of Student Conduct

### Commentary

1. Dalhousie University is a community of faculty, support staff and students, involved in teaching, research, learning and other activities. Students are members of the University for the period of their registration in the academic programme to which they have been admitted and as such assume the responsibilities that such registration entails.
2. The University does not stand *in loco parentis* to its student members, that is, it has no general responsibility for the moral and social behaviour of its students, as if they were its wards. In the exercise of its disciplinary authority and responsibility, the University treats students as 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 of University activities, the peaceful and safe enjoyment of University facilities by other members of the University and public, the freedom of members of the University to participate reasonably in the programmes of the University and in activities in or on the University's premises, or the property of the University or its members. Strict regulation of such activities by Dalhousie University is otherwise neither necessary nor appropriate.
3. University members are not, as such, immune from the criminal and civil laws of the wider political units to which they belong. Provisions for non-academic discipline should not attempt to shelter students from their civic responsibilities nor add unnecessarily to these responsibilities. Conduct that constitutes a breach of the Criminal Code or other statute, or that would give rise to a civil claim or action, should ordinarily be dealt with by the appropriate criminal or civil court. In cases, however, in which criminal or civil proceedings have not been taken or would not adequately protect the University's interest and responsibilities as defined below, proceedings may be brought under a discipline code of the University.
4. The University must define standards of student behaviour and make provisions for student discipline with respect to conduct that jeopardizes the good order and proper functioning of the academic and non-academic programmes and activities of the University or its faculties, schools or departments, or that endangers the health, safety, rights or property of the University or its members or visitors.
5. The University may also define standards of professional conduct for students in programmes where these are appropriate, and this Code is not intended to replace or supersede such standards.

### 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 programmes or services or for University-approved events and activities.
2. In this Code, "student" means a person:
  - (i) 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
  - (ii) 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. Offences

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

- (i) occurs on premises of Dalhousie University or elsewhere in the course of activities sponsored by Dalhousie University or by any of its faculties, schools or departments; and
- (ii) is not specifically assigned to another disciplinary body within the University as in the case of sexual harassment as described in the Policy and Procedures: Sexual Harassment; and
- (iii) (a) has not already been dealt with as failure to meet standards of professional conduct as required by a college, faculty or school; or  
(b) is not subject to the disciplinary authority of the Dalhousie Student Union; or  
(c) is not 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.

### 1. Offences Against Persons

- (a) No student shall assault another person sexually or threaten any other person with sexual assault.
- (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.

### 2. Disruption

No student shall undertake by action, threat or otherwise, to disrupt, obstruct or adversely affect any activity organized by Dalhousie University or by any of its faculties, schools or departments, or the right of another person or 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, mis-use, destroy or damage the property or premises 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 deface the property of Dalhousie University.
- (c) 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 appropriated without authorization.
- (d) 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 a person or persons authorized to give such instruction, unless the student has good reason for doing so.
- (b) No student shall gain access to or use any University computing or internal or external communications facility to which legitimate authorization has not been granted. No student shall use any such facility for any commercial, disruptive or unauthorized purpose, or in any other way that is incompatible with the principles in the Guide to Responsible Computing.

- (c) No student shall mutilate, misplace, misfile, or render inoperable any stored information such as books, film, data files or programmes 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.

### 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 programmes or services, or University-approved events or activities.

## C. Procedures

1. Whenever possible and appropriate, reason and moral suasion 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.
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. The Vice-President, Student Services, shall invite the President of the Student Union or his or her designate to participate in any attempts to resolve the matter informally. If an informal disposition of the complaint results, such disposition shall be final and there shall be no subsequent proceedings.
4. 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.
5. Hearings shall be conducted by the Senate Discipline Committee according to procedures determined by the Committee.
6. The President or designate shall appoint a person to present the complaint.
7. 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.

## D. 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) Fines—Previously established and published fines may be imposed.
  - (e) Restitution—Compensation for loss, damage or injury. This may take the form of appropriate service and/or monetary or material replacement.
  - (f) Discretionary Sanctions—Work assignments, service to the University or other such discretionary assignments that are considered appropriate by the Discipline Committee.
  - (g) Conditions—Conditions may be imposed upon a student's continued attendance.
  - (h) 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.
  - (i) 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.

## E. 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 normal operations of the University.
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.

## Suspension or Dismissal from a Programme 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 programme 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 caregivers 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:

- (i) 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;
- (ii) 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;
- (iii) 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;
- (iv) 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:

- (a) with respect to the terms under which they were granted access to them;
- (b) in a way that respects the rights of other authorized users;
- (c) so as not to interfere with or violate the normal, appropriate use of these facilities;
- (d) 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 cooperate in such investigations when requested. Failure to do so may be grounds for cancellation of computer access privileges.

# Faculty of Graduate Studies

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## Office of the Dean

Location: Arts & Administration Building  
Room 314  
Studley Campus  
Halifax, NS B3H 4H6

Telephone: (902) 494-2485  
Fax: (902) 494-8797  
E-mail: [graduate.studies@dal.ca](mailto:graduate.studies@dal.ca)  
Website: <http://www.dalgrad.dal.ca>

## Administrative Officers

### Acting Dean

Rutherford, J., BA (Cornell), MS (Syracuse), PhD (SUNY)

### Associate Dean

Neville, C.J., BA, MA (Carleton), PhD (Aberdeen), FRHistS

### Secretary

Ross, T., BA, MA (Carleton), PhD (Toronto)

### Faculty Administrator

Wood, M.J., BA, MMM (Dal)

### Admissions and Programme Officer

Maynard, B.A.

### Admissions Officer

Barrett, W.

### Assistant to the Dean

Scott, M.

## Faculty Council

Bearne, S., 2001 Biochemistry  
Bishop, M., 2001 French  
Burns, S., 2003 Philosophy  
Cadigan, S., 2001 History  
Caldwell, C., 2003 Agriculture  
Cleave, P., 2002 Human Communication Disorders  
Croll, R., 2002 Physiology and Biophysics  
Dasgupta, S., 2001 Economics  
Duinker, P., 2002 Resource and Environmental Studies  
Finbow, R., 2001 Political Science  
Gagnon, G., 2003 Civil Engineering  
Gibson, E., 2002 Law  
Harbison, J., 2002 Social Work  
Iverson, S., 2002 Biology  
Meagher-Stewart, D., 2002 Nursing  
Milios, E., 2002 Computer Science  
Neville, C., Associate Dean  
Pincock, J., 2002 Chemistry  
Ross, T., 2002 English (Secretary)  
Rosson, P., 2003 Business Administration  
Rutherford, J., Acting Dean, (Chair)  
Stroink, G., 2001 Physics  
Sunderland, E., Associate University Librarian  
Thompson, J., 2002 English  
van Roosmalen, E., 2003 Sociology & Social Anthropology

(Each discipline shall have only one elected member on Faculty Council at any given time.)

## Faculty Regulations

The complete details of the Faculty of Graduate Studies regulations are included in the Manual for Governance, Policies and Procedures, which is available in the faculty and departmental offices and on the Faculty of Graduate Studies website at [www.dalgrad.dal.ca](http://www.dalgrad.dal.ca). Detailed information about particular programmes 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 programmes of study at the University. Except where noted, Faculty of Graduate Studies regulations take precedence over 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 website.

## Faculty of Graduate Studies Website

A large number of forms are available on the Faculty of Graduate Studies website at <http://www.dalgrad.dal.ca/homepage.htm>. Forms are updated on a regular basis.

## I. Graduate Programmes

Graduate programmes are offered at Dalhousie University in a variety of research and professional fields at the diploma, master's and doctoral level.

### 1.1 Degree Programmes

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

- Doctor of Philosophy (PhD)
- Doctor of Philosophy/Doctor of Medicine (MD/PhD)
- Doctor in the Science of Law (JSD)
- Master of Applied Science (MASc)
- Master of Applied Science/Master of Urban and Rural Planning (MASc/MURP)
- Master of Architecture (First Professional) [MArch (First Prof)]
- 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 (Information Technology) [MBA(IT)]
- Master of Business Administration/Bachelor of Laws (LLB/MBA)
- Master of Computer Science (MCSc)
- Master of Development Economics (MDE)
- Master of Electronic Commerce (MEC)
- Executive Master of Electronic Commerce (MEC)
- Master of Engineering (MEng)
- Master of Engineering/Master of Urban and Rural Planning (MEng/MURP)
- Master of Environmental Design Studies (MEDS)
- Master of Environmental Studies (MES)
- Master of Health Services Administration (MHSA)
- 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 Technology Education (MITE)
- 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 Marine Management (MMM)
- Master of Nursing (MN)
- Master of Nursing/Master of Health Services Administration (MN/MHSA)
- Master of Public Administration (MPA)

- Master of Public Administration (Management) [MPA(Mgmt)]
- Master of Public Administration/Bachelor of Laws (LLB/MPA)
- Master of Science (MSc)
- Doctor of Medicine/Master of Science (Oral and Maxillofacial Surgery) (MD/MSc)
- Master of Social Work (MSW)
- Master of Urban and Rural Planning (MURP)
- Graduate Diploma in Public Administration (GDPA)

<i>One Year Programme</i> Fee: one year programme fee, followed by continuing fees as required; or per class fees	4.5 full credits plus a thesis	5.5 full credits plus a graduate project	6.5 full credits
<i>Two Year Programme:</i> Fee: two years of programme fees, followed by continuing fees as required; or per class fees	5-9 full credits plus a thesis	6-11 full credits plus a graduate project	7-13 full credits

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

## 1.2 Programme Administration

Graduate programmes at Dalhousie are administered at the Faculty level and at the Department/Programme level.

### 1.2.1 Department/Programme Level

At the department level all graduate programmes are administered through a Graduate Coordinator.

## 1.3 Programme Definition

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

### Programme Fee Degrees

Most graduate research programmes at Dalhousie University have a minimum period for programme fee payment and residency requirements. For example, a one year programme involves a programme fee requirement of one year (or three successive terms), during which a full-time student is expected to be on campus unless otherwise given permission to take classes or undertake research somewhere else. At the master's level, students can be admitted into either a one year or two year programme (there is also one three-year programme). Doctoral programmes at Dalhousie are normally at least two year programmes (i.e. they have at least a two year programme fee and residency requirement, six terms). If students have to continue beyond the programme fee requirement period to complete their degree, additional continuing fees are required. Students in master's thesis programmes should normally expect to take 6 to 12 months beyond the programme fee requirement period to complete their studies. Students in doctoral programmes should expect to take 12 to 24 months beyond the programme fee requirement period to complete their studies. Students must pay continuing fees until all of the requirements of their programme have been successfully completed.

### Per-Class Fee Degrees

Some graduate programmes 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 programmes:

- Master of Architecture - First Professional
- Master of Urban and Rural Planning
- Master of Business Administration (2 Year Programme)
- Master of Engineering (Internetworking Only)
- Master of Health Services Administration
- Master of Public Administration
- Master of Social Work
- Qualifying, Visiting or Special Graduate Students

### 1.3.1 General Programme Definitions - Master's Level

Master's programmes are usually structured in one of three ways: 1. classwork plus a thesis; 2. classwork plus a graduate project; or 3. classwork only. Some programmes 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.

Programme Length (Fee Requirement)	Classwork plus Thesis	Classwork plus Project	Classwork Only
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Master's programmes exceeding the maximum number of credits for a two year programme are considered as three year programmes and fees are applied accordingly.

### 1.3.2 General Programme Definition - Doctoral Level

All doctoral programmes at Dalhousie require a full-time residency period as defined below.

*Two Year Residency:* For students who enter with a first-class research Master's degree. Fee: two years of programme fees followed by continuing fees as required.

*Three Year Residency:* For students who enter directly from first-class undergraduate degree with honours standing as granted by Dalhousie. Fee: three years of programme fees followed by continuing fees as required.

## II. Admission Requirements for Graduate Programmes

Please note that entry into Dalhousie's graduate programmes is very competitive, and applicants who meet the minimum requirements are not guaranteed admission. Normally, successful applicants have academic records and qualifications which 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 programmes. 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. Final decisions on all admissions are made by the Faculty of Graduate Studies, and there are no appeals on admission decisions. The Faculty of Graduate Studies reserves the sole right to reject applications from candidates who meet or exceed the minimum admission requirements.

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 which are fully recognized by Dalhousie.

### 2.2 Master's Degree Programme

Candidates for admission must hold at least a Bachelor's Degree with a minimum B average from a university of recognized standing, with the following conditions:

- For entry into a Master's programme with a thesis requirement (these are normally one year programmes, as described above), 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 Baccalaureate 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 an honours programme was not available to them, first-class candidates will be considered for admission to a two year programme.
- For entry into all other programmes (normally involving a programme fee requirement and residency period of more than one year), 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 for their degree.
- c) Some professional programmes offer a one year master's programme for which an honours degree or equivalent is not required for admission. See Departmental Listings for details of individual programme admissions.

A small number of mid-career Master's degrees (see 6.2.3 below) allow entry either with or without a Bachelor's degree, depending on the qualifications of the applicant. Currently, such programmes include the MBA (Financial Services) programme and the MPA (Management) programme. Admission to such programmes, as with all graduate programmes, is at the discretion of the Faculty of Graduate Studies.

### 2.3 Doctoral Degree Programmes

The criteria for admission to doctoral programmes are more rigorous than that for master's programmes. The successful completion of a Master's degree does not guarantee admission to a Ph.D. programme. Typically a Ph.D. 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\* research Master's Degree, or its equivalent, from a recognized university, for entry into a Doctoral programme with a two (2) year programme 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 recognized 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 programme with a three (3) year programme 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 programme with the possibility of transferring into the doctoral programme, as described below.

A few departments will admit a Bachelor's graduate with a first class honours degree into the Master's programme and recommend them for transfer to the Doctoral programme within the first year of study. 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 research Master's programme with the possibility of transferring into a Ph.D. on the basis of demonstrating outstanding academic and research potential. Students who wish to transfer from a Master's to a Doctoral programme must normally do so within the first 15 months of initial registration.

### 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 programme in English before admission. The standard test is the TOEFL. The Faculty sets a minimum acceptable score of 580 for the written TOEFL and 237 for the computer, but some programmes within the Faculty set a higher minimum (especially if the students are expected to be Teaching Assistants). 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, 4.5 (pending approval).

Further information on these tests may be obtained from

- a) Test of English as a Foreign Language (TOEFL)  
Education Testing Service  
P.O. Box 6151  
Princeton, NJ  
USA 08541-6151

- b) Michigan English Language Assessment Battery (MELAB)  
English Language Institute (ELI)  
University of Michigan  
Ann Arbor, Michigan  
USA 48109-1057
- c) International English Language Testing System (IELTS)  
University of Cambridge Local Examinations Syndicate  
1 Hills Road  
Cambridge, UK  
CB12EU

Candidates with a TOEFL score of between 550 and 579 on the written TOEFL or between 213 and 236 on the computer TOEFL or who are unable to sit the TOEFL or other equivalent test, but otherwise meet all admission requirements and conditions, may be admitted to Dalhousie University with the pre-requisite that they attend the approved university preparatory programme. Students must successfully complete the programme and obtain a TOEFL score of 580 or better before being allowed to start their programme of study. Additional requirements (such as the Test of Written English) may be required. This option is limited to situations where the university has entered into a special international agreement or in exceptional individual cases, and admission is at the sole discretion of the Faculty on recommendation of the department. For Teaching Assistants, a written TOEFL of at least 600 is normally required.

### 2.5 Conditional Admissions

If a conditional admission is approved, the condition must be met within the first year of the programme at the latest. If the condition is not met within 12 months of initial registration, the student's registration will be terminated. Note that the Faculty may set a shorter time period for a condition to be met. 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 for information on specific programme admission requirements.

### 2.7 Advanced Placement

Normally advanced placement cannot be given for classes already counted towards a previous degree but it can be used to reduce a master's programme from two years to one when the student's previous degree and standing markedly exceed the normal qualifications.

### 2.8 Students with Learning Disabilities

See University Regulations, page 11.

## III. Graduate Application Process

### 3.1 Faculty Application Forms and Supporting Materials

All applicants for graduate programmes at Dalhousie must complete the Faculty of Graduate Studies Application for Admission Form. These forms may be obtained from the Registrar's Office, Dalhousie University, Halifax, NS, B3H 4H6. All supporting materials (including references, official transcripts from all post-secondary institutions attended, official GMAT or GRE scores, official TOEFL scores, etc.) should be sent directly to the department to which the student is applying. In the case of applicants to the Interdisciplinary PhD programme, all material should be sent to the Dean's Office of the Faculty of Graduate Studies. **Note that supporting documents (transcripts, letters of reference, etc) will be verified for authenticity.** Applicants submitting fraudulent documents will have their names published on the listserv of the Association of Registrars of Universities and Colleges in Canada.

### 3.2 Application Deadlines

The Faculty of Graduate Studies normally admits students to commence their programmes in the fall term (September). See Admission Dates, pg. 2. However, some academic units may consider applicants to commence in the winter term (January) or the summer term (May). 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	November 15	August 31
For May Admission	February 28	December 31

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

\*If Visa processing is lengthy (such as in the People's Republic of China), applicants should apply at least two months before the deadline, e.g. by January 31 for September admission.

### 3.3 Specific Programme Deadlines

The following programmes have different application deadlines.

MSW . . . . .	December 1
JSD . . . . .	January 1
MES . . . . .	February 1
HCD . . . . .	March 1
MN . . . . .	April 1
MHSA and LLM . . . . .	May 1
MD/MSc Oral and Maxillofacial Surgery . . . . .	June 1*
MMM . . . . .	March 31

\* of year preceding commencement of programme

Applicants who wish to be considered for university scholarship support are strongly advised to apply by January 31. 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 which 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 recognized 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 programme of studies.

### 3.3 Departmental and Faculty Approval

All applications are reviewed by the appropriate department (usually the department's Graduate Studies Committee), and the department makes a recommendation to the Faculty 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 programme, 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, and a formal letter of acceptance is issued by the Registrar's Office. Successful applicants will also receive a letter from the Dean of Graduate Studies.

### 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 programme. 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 Dalhousie Graduate Scholarship will receive a letter of notification of their award from the Dean 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.**

## IV. Registration Procedures and Regulations

It is the student's responsibility to register. Registration is the process by which the student officially establishes with the University (through the Office of the Registrar) the degree programme (MA, MSc, PhD, etc.) and status (full-time, part-time, etc.) and pays the appropriate academic fees (Student Accounts).

Both aspects of the process (programme/status and fee payment) must be completed before a student can be said to be 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

#### Programme-Fee Programmes

Graduate students in programme-fee programmes must maintain their registration on a continuing basis (i.e. they must register for and pay the required tuition fee for each and every term following their official start date). If graduate students allow their registration to lapse for more than one term, they will be automatically withdrawn. Failure to register by the required deadlines in successive terms may also lead to automatic withdrawal.

#### Class Fee Programmes

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

### 4.2 Registration Procedures

Registration material will be mailed by the Registrar's Office to Canadian and continuing visa students. Such students are encouraged to register early. Such students are reminded that they must inform the Registrar's Office or the Faculty of Graduate Studies Office of their current address. **New visa students must report in person to the Faculty of Graduate Studies Office on or before the day specified by the Faculty to collect registration material.**

Continuing students who require an extension to their programme 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 do not register on or before the university's last day to register must apply in writing to the Faculty for permission to register. A financial penalty will apply. Any student who fails to register by the official deadlines will not be allowed to submit a thesis or obtain any service whatsoever from the University during that academic year.

Students who change their registration status by the addition or deletion of classes must report this to the Faculty 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, only with the permission of the Faculty of Graduate Studies.

Withdrawal from a degree programme should be reported immediately to the Faculty Office since reimbursement of fees is calculated from the official date of withdrawal.

#### 4.2.1 Registration Deadline

All students must be registered by the deadline for each term.

#### 4.2.2 Failure to Register (Programme Fee Students)

Students who fail to register within the appropriate deadlines will not be allowed to submit a thesis nor will they receive any services whatsoever from the University during that academic year.

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 below).

#### 4.2.3 Withdrawal

Students who withdraw from a degree programme should immediately inform in writing, the Graduate Coordinator of their programme and the Faculty of Graduate Studies. The immediacy of notification is important since the amount and speed of fee reimbursement is influenced by the date of withdrawal. A withdrawal is not official until it has been approved by the Faculty and received in the Registrar's Office. Under no circumstances will the Faculty back-date a withdrawal notice. In any programme designated as a "Limited Enrollment Programme", the first instalment of the fee is not refundable except on compassionate grounds (e.g. illness).

#### 4.2.4 Academic Dismissal

A student may be required to withdraw from a programme for academic reasons (e.g. resulting from class failure, failure of comprehensive exams, or lack of academic progress), for academic offences such as plagiarism, irregularities in the presentation of data, etc., (see Intellectual Honesty, pg. 12 and Senate Discipline Committee, pg. 12), for non-academic reasons, (see Code of Student Conduct, pg. 13), 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.

#### 4.2.5 Readmission of Students

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 withdrawn may not apply for re-admission for at least 12 months following the official date of the withdrawal.

**Readmitted programme fee students (except those who were withdrawn for academic reasons) must pay fees for the years they were not registered, at the current fee rate.**

Students in thesis programmes 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 programme. Application for readmission must meet normal application deadlines, and all outstanding fees must be paid.

#### 4.2.6 Readmitted students (per course fee students)

Graduate students in programmes where fees are paid on a per-course basis can allow their registration to lapse for one term without penalty, with written approval of the department and Faculty of Graduate Studies (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 the equivalent of three credit hours for each semester in which registration lapsed.

A student who is academically withdrawn in a programme which allows them to carry one failure may be immediately reinstated following a recommendation by the Graduate Coordinator for an appropriate replacement of the failed class.

#### 4.2.7 Concurrent Registration

A student may, with the Dean's permission, register for two concurrent degrees, 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 programme. This does not apply to a Dalhousie student finishing a master's degree who has been accepted into a PhD programme. In that case, the student must first complete the master's and then register in the PhD programme 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 onus is on the department to defer the admission to the next available start date.

### 4.3 Student Categories

All students must register in each year and in each term of their graduate programme in one of the following categories:

#### 4.3.1 Full-Time Student (Programme Fee Student)

A student who is carrying more than two and one-half (2.5) full-credit classes during the semester to a maximum of 13 half-credits per year or a student who has not yet completed the minimum number of years of full-time study required for a particular degree programme (e.g. the first two years of a doctoral programme require full-time status). A student may register full-time and hold jobs simultaneously only if the job involves no more than 16 hours' work per week, including a maximum of 10 hours as a teaching assistant.

#### 4.3.2 Full-Time Student (Per Course Fee)

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

#### 4.3.3 Part-Time Student (Programme Fee Student)

A Master's student who is carrying not more than two and one-half (2.5) full credit classes during the 12-month academic year, or a student who has not yet completed the minimum number of years of part-time study required for a particular degree programme.

#### 4.3.4 Part-Time Student (Per Course Fee Student)

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

#### 4.3.5 Continuing Student (Programme-Fee Programmes Only)

A student in a programme which is charged a programme fee and who has completed the programme fee and residency requirements 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)

A qualifying student is a person with a Bachelor's degree or its equivalent who meets normal Faculty admission standards and in whom a department has expressed an interest as a potential graduate student, but who is without a sufficiently strong academic background in a particular discipline to be enrolled directly into a Master's programme. For example, a Qualifying Year may be used for a student to take an Honours equivalency certificate, or to take a year of senior undergraduate classes in an area of deficiency in their undergraduate degree. Only in exceptional circumstances may a student be admitted to a Qualifying Year to upgrade a below-standard undergraduate degree or academic record.

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 programme cannot be used to reduce the length of a subsequent regular graduate programme. Qualifying students are not eligible for scholarship or bursary support and must apply for admission to the appropriate graduate programme 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 programme first and then consider them for transfer into the doctoral programme at a later date.

#### 4.3.7 Special Student-Graduate Studies (SSGS)

With permission of the Faculty, students are sometimes permitted to take a graduate class outside of a programme. Such students, who have not been admitted to a graduate programme, 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-programme students must have records which meet the minimum entrance requirements for a graduate programme (hence they must be approved by the Faculty as admissible to a graduate programme). Students are ineligible to apply for Special Student status in a class if they have been rejected from the programme on account of academic standing, or have been withdrawn from the programme. The registration category for non-programme students taking graduate classes is Special Student-Graduate Studies (SSGS).

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 programme must follow a different route: either a Qualifying Year programme, if eligible, or a programme of study as a Special Student in an undergraduate faculty.

Classes completed under SSGS status may not be used for credits towards formal graduate programmes unless approval has been granted by the Faculty at the time of admission.

#### 4.3.8 Spring and Summer Sessions (Summer School)

All students must maintain their registration and pay fees.

#### 4.3.9 Letters of Confirmation

A letter confirming a student's registration and/or scholarship status can be produced on request. There is a small administrative fee for this service. Students should contact the Faculty of Graduate Studies Office or the Registrar's Office for information on this service. Students who require a letter of confirmation regarding their scholarship should contact the Faculty of Graduate Studies.

#### 4.4 Approval of Programme

Every graduate student must have an individually approved programme of studies. The programme or course of study for each graduate student must be approved by the Graduate Coordinator in each department or programme and submitted for final approval to the Faculty of Graduate Studies. The Graduate Coordinator will enter the proposed programme (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 Programme Approval Form. The form must be signed by the student and the Graduate Coordinator before submission to the Faculty. The signed form should normally be submitted to the Faculty within one month of the official start of the student's programme of studies. Once approved, the Programme Form constitutes an agreed contract between the student and the university for the requirements to complete the programme. Any changes to the approved Programme Form must be agreed to by the Graduate Coordinator and the Faculty.

#### 4.5 Leave of Absence

Students who need to take leave from their programme of study because of illness or a serious problem outside the student's control, may apply in writing through their department or school for a "Leave of Absence". If the department or school recommends to the Faculty that leave of absence be granted, and if the Faculty is also satisfied that the need is justified, such leave will be granted (see 4.5.2 below for permissible leave periods).

#### 4.5.1 Terms of a Leave of Absence

An official leave of absence does not count towards time in programme (in effect, the clock stops ticking). Students may not hold any Dalhousie Scholarships during a leave of absence. During a leave of absence a student cannot study elsewhere for credit at Dalhousie.

A leave of absence not only frees the student from the necessity of paying tuition fees, it also releases the university from the obligation to provide the student with services. These include consultations with professors and student library privileges.

#### 4.5.2 Periods and Application Deadlines for Leaves of Absence

Leaves of Absence can be granted for the following periods: September to December; January to April; and May to August. Students may apply for successive term leaves up to a maximum of three terms (one year).

Applications for leave of absence (normally limited to one leave period during an individual's programme) must be made by August 17 for a leave commencing September 1, December 10 for a leave commencing January 1, and April 16 for a leave commencing May 1.

Under no circumstances will retroactive approval be given for leaves of absence.

#### 4.6 Suspension of Studies

Unexpected circumstances and short-term emergencies that do not warrant a Leave of Absence can be accommodated through a suspension of programme but no fee rebate is possible in such cases. A student must apply in writing to the Faculty for a suspension of programme 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 programme

requirements during the period of suspension, but it does contribute to time in the programme (*i.e.* the clock does not stop ticking). Normally, a suspension of studies shall be for no longer than one term.

#### 4.7 Maternity Leave

Maternity leave of one to three terms will be granted without prejudice to academic standing or eligibility for financial support. Any refund of fees will be governed by university regulations, see Fees Section, Table III. In exceptional circumstances, paternity leave of 4 months may be granted.

#### 4.8 Fees for Continuing Students and International Students

##### 4.8.1 Continuing Fees (for Programme Fee Programmes only)

After students have completed the required programme fee period and have paid all their fees, but are still short of completing their programme, they pay a Continuing Fee until all the academic requirements of the programme have been completed. Usually, Continuing Fees are paid by students who are in the process of completing a thesis or graduate project.

Note: Under the programme or continuing fee, students may take only those classes specified by the department as requirements for the degree.

##### 4.8.2 Differential Fees for International Students

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

Full-time Master's student (except Oral and Maxillofacial Surgery) (or equivalent)	2 years
Full-time Master's/MD student Oral and Maxillofacial Surgery	4 years
Part-time Master's student	6 years
Full-time PhD student (following a Master's degree)	3 years
Full-time PhD student (following a Bachelor's degree)	5 years

The graduate programme differential fee will vary depending whether the programme requires fee payments two or three terms per academic year. (The following 2000/2001 fees are listed for information only.)

- Full-time - \$1,800.00 per term with fees payable two terms per academic year.
- Full-time - \$1,200.00 per term with fees payable three terms per academic year.
- Part-time - \$600 per term with fees payable two terms per academic year.
- Part-time - \$400 per term with fees payable three terms per academic year.

The graduate per class differential fee is based on the number of billing hours taken during a term.

- Full-time - \$1,800.00 per term (9 billing hours or more).
- Part-time - \$120.00 per billing hour (less than 9 billing hours).

#### 4.9 Identification (ID) Cards

Full-time, part-time and continuing students in a degree programme, 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.

#### 4.10 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](http://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.

## V. Scholarly Integrity, 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 programmes 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:

Members of Faculty of Graduate Studies committees shall refrain from voting on matters pertaining to their own departments. No elected committee member shall serve on an award or grant committee (*i.e.* scholarship, postdoctoral fellowship, research development fund) for more than two consecutive terms.

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 programme requirements and then only with the permission of the Dean 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 programmes offered on the Sexton campus 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, pg. 16 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. Copies of the guidelines are available from the Faculty Office, from Graduate Coordinators, and from the Faculty web page.

### 5.4 Policy on Intellectual Property

The Faculty is developing a policy on Intellectual Property, which will be available from the Faculty Office and from the Faculty web page.

If students and/or faculty have concerns or doubts about any issue pertaining to any part of this Section 5, consult with your Chair, Graduate Coordinator, or Supervisor, or contact the Faculty Office 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 programme.

### 6.1 Length of Programme

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

### 6.1.2 Extensions

Students in thesis programmes may apply for extensions to the upper time limits. A first extension of one year may be granted by the Faculty on the recommendation of the department, along with a satisfactory Progress Report Form completed and signed by the student and the supervisor.

Request for one further one year extension, the Final Extension, must include a report of progress in 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. Further extension will only be given for one term to provide for necessary revisions to the thesis following defence. Under no circumstances can a student be registered in a programme for more than 10 years.

### 6.2 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 programmes are usually terminal degrees, while the thesis-based programmes can lead to doctoral studies. Master's programmes may also have additional requirements such as graduate projects, practicums, or internships.

#### 6.2.1 Thesis-based Master's Degrees

The course of study for the research degree (MA, MASc, MArch (First Prof), MSc, MDE, MEDS, MES, MURP and the thesis options available in the LLM, MArch (Post-Prof), MCSc, MEDS, 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 programme to programme, and even within the same programme, depending upon students' previous experience and qualifications.

#### 6.2.2 Class-based Master's Degrees

Non-thesis Master's programmes include the MBA, MBA (IT), MEng, MHSA, MITE, MMM, MPA, and non-thesis options in the MArch (Post-Prof), MEC, MEDS, LLM, MCSc, MN, MLIS and MSW. The number of classes varies and a graduate research project is often required.

#### 6.2.3 Specialty and Executive/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 programmes are executive degrees designed for mid-career professionals. These are primarily class-based programmes, with some component of work and professional experience (either as part of the programme or as pre-requisites for admission). These programmes are normally based on a full cost-recovery, class-fee basis. They currently include the MBA (Financial Services), MPA (Management), MEng (Internetworking), and the Executive Masters of Electronic Commerce.

### 6.3 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 two (2) years 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 programme, or not later than the beginning of the third year, and in no case not 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.

Candidates for graduate degrees frequently have teaching duties which are remunerated through the undergraduate and professional teaching faculties. The teaching duties of full-time graduate students must not exceed ten hours a week, including preparation time.

#### 6.4 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 Curriculum Committee) as part of their graduate classwork, the minimum B- grade also applies. Note that there is no W (Withdrawal) grade for graduate students (See also 6.4.5 below) except where a student formally withdraws from the programme.

In those doctoral programmes which 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 programme of studies (*i.e.* they are in addition to the required number of graduate credits).

##### 6.4.1 Academic Transcript

Your academic transcript is a reflection of your academic progress and, therefore reflects both passes, failures, and late withdrawals. 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.

##### 6.4.2 Grading Policy

Faculty regulations stipulate that graduate students must achieve a minimum, or passing, grade of "B-" in all classes required as part of their degree programme. Any lower grade will be recorded as a failure (including Marginal Failure). 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
FM (Marginal Failure)	67-69
F	<67

##### Pass Standard

- 1) Graduate students must achieve a minimum, or passing, grade of "B-" in all classes required of their degree programme, except those in programmes 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 automatically withdrawn (academically dismissed) immediately from the programme. However, such a student may apply, in writing, to the department for readmission. Students who receive an FM are not necessarily assured of readmission and students who receive an F can still be considered for readmission. Readmission to a programme must be supported by the Graduate Co-ordinator, and must be approved in writing by

- 2) the Faculty. Note that any academic withdrawal and readmission will be recorded on the student's official transcript. In the following programmes, Architecture, Business Administration, Computer Science, Engineering, Health Services Administration, Library and Information Studies, 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 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.

##### 6.4.3 Ancillary Classes

Undergraduate classes which a department recommends as advisable additional background to the degree programme, but not specifically required for that programme, 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 Programme of Graduate Studies form but do not count towards the required number of classes for the graduate programme. Normally students are limited to one ancillary class (6 credit hours) in their programme. Students who take ancillary classes on a Letter of Permission are responsible for the tuition fees at the other institution.

##### 6.4.4 Letters of Permission for Classes Taken Outside Dalhousie

Classes approved by the department and faculty (after examination of class descriptions) can be taken at other universities on "Letter of Permission" as part of the graduate degree programme provided that the class is not available at Dalhousie. The maximum number of classes taken outside Dalhousie University shall normally be confined to 25 per cent of the class requirements except in those cases where a university-level agreement, governing specific cooperative arrangements, has been negotiated and is in operation. Grades received below B- for classes taken on a Letter of Permission at another institution will be recorded as a failing grade on the student's Dalhousie record. For non-Dalhousie classes taken by Letter of Permission, students must achieve the equivalent of a B- or better in order to achieve a pass standing at Dalhousie.

Students who fail a class may not replace that class on a letter of permission.

The normal regulations governing grading policy (6.4.1) apply to classes taken at other institutions (*e.g.*, a C+ on a graduate class taken elsewhere will be deemed an "FM" in the student's programme and may render him/her liable to academic withdrawal).

Full- and part-time students are eligible to apply to take a class on a Letter of Permission. Students may take no classes outside Dalhousie for graduate credit unless prior approval of a Letter of Permission has been received from the Faculty. Letters of Permission are not approved retroactively.

Graduate Students who pay a programme fee must be registered at Dalhousie and have paid appropriate fees before letters of permission will be approved.

Dalhousie will normally pay the tuition for students who pay a programme fee to take classes by letter of permission that are offered at other Maritime universities, 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 programme. Students who wish to take classes at institutions within or outside the Maritimes for non-academic reasons or for convenience may do so at their own expense.

Students who pay on a per class basis are responsible for paying fees for classes taken outside Dalhousie.

##### 6.4.5 Audits

Students may take one audit (equivalent of 6 credit hours) in each residency year of their formal programme. Audits must be listed on the Programme of Graduate Studies form, and must be relevant to the student's programme of study. Audits cannot be taken on Letter of Permission and will not be approved as part of a Qualifying programme.

#### 6.4.6 Withdrawal From Classes

It is recognized that some students may wish to make changes in programmes already arranged. Class changes will normally be completed during the first two weeks of classes. (For Summer term information, see the Summer School Schedule.) The last dates for adding and deleting classes are published in the schedule of Academic Class Add/Drop Dates on page 1 of this calendar. For withdrawals within this period, the class and the withdrawal is not recorded on the academic record. After these dates, the student is responsible for the content of the class and receives a grade for it.

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](http://www.dal.ca/online) by September 21 for the Fall 2001 term and January 21 for the Winter 2002 term. Thereafter, students must complete a class change form which has been approved by the instructor concerned and submit it to the Registrar. Changes submitted on class change forms are effective the date they are received in the Registrar's Office. A late class add/drop form is recorded as a failure. Unlike undergraduate classes, **no 'W' (withdrawal) grade exists for graduate classes** except where a student formally withdraws from the programme.

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](http://www.dal.ca/online) or written notification is received at the Office of the Registrar.**

#### 6.4.6. 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 it, a grade of "Incomplete" 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 term classes . . . . .	June 1
May-June classes . . . . .	August 1
May- August classes . . . . .	October 1
July-August classes . . . . .	October 1

MBA(FS) and MBA(IT) - Please consult departmental entry.

After these deadlines, an "Incomplete" cannot be changed without permission of the Faculty, and will appear on the official academic record of the student.

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

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

#### 6.4.8 Incomplete due to Illness

Where illness is involved, a certificate from the student's physician will be required. This certificate should indicate the dates and duration of the illness, when possible should describe the impact it had on the student's ability to fulfil academic requirements, and should include 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 the University Health Services or their physician at the time they are ill and should submit a medical certificate to their 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 of ILL is as follows:

Fall term classes . . . . .	February 1
Winter and Regular term classes . . . . .	June 1
May-June classes . . . . .	August 1
May-August classes . . . . .	October 1
July-August classes . . . . .	October 1

Requests to change grades after these deadlines must be submitted in writing to the appeals committee of the appropriate school, college or faculty and a recommendation will be forwarded to the Faculty of Graduate Studies.

NOTE: Any student whose request for special arrangements has been denied and wishes to appeal, should refer to Appeals, page 31.

NOTE: All outstanding grades, including ILL or INC, must be cleared up 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 and pay an additional fee.

#### 6.4.9 In Progress Classes

The grade of "In Progress" 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 and regular session classes.

#### 6.4.10 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 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 6.4.2 for information on grade scheme.

### 7.2 Qualifying or Preliminary Examinations

Some doctoral programmes require Qualifying or Preliminary Examinations. These occur early on in the doctoral programme (often within the first year) and are sometimes used to assess the transfer of a student from a master's to a doctoral programme. 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 programmes in some departments and all PhD degree programmes. 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 programme 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 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 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 11 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 programme. All graduate research projects must also have an Advisor, and in some departments, graduate research projects also require an Advisory or Guiding Committee.

#### 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 programme.

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 programmes 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 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 recognizes 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 practice regarding external supervisors or supervisors not from the student's department or programme. An honorary 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 programme or where successful involvement of an external supervisor (honorary member of the Faculty of Graduate Studies) 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 programmes, 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 programme. The selection of all Supervisory Committees is approved by the Faculty. 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 programme. 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

These guidelines were developed in 1981 at a conference sponsored by the Faculty of Graduate Studies and the Dalhousie Association of Graduate Students. They were reviewed and endorsed by the Dean and Graduate Coordinators in January 1992. They were updated for inclusion in the Faculty of Graduate Studies Governance Manual in 1995 (see revised manual, 1998). In 1996 they were updated and incorporated within the Faculty Guidelines on Integrity in Scholarly Activity, and will be updated again as the need arises. Where appropriate, units can adopt these guidelines for project students and their supervisors but they are designed primarily for thesis students.

#### 8.6 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 which 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.

#### 8.7 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.

#### 8.8 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.

### 8.9 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.

### 8.10 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.

### 8.11 Responsibilities of the Department

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

- 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 337, Arts and Administration Building. Application guidelines are available from Pat Lindley in this 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.

### 9.2 Preparation of Manuscript and Submission of Theses

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

#### 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 Regulations for Submission of Theses are available from the Office of the Dean on the Studley Campus.

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

#### 9.2.2 Thesis Originality and Editing

A thesis must present the student's own work, and all students are advised to read the university regulation on Plagiarism (including self-plagiarism) under the University Regulations part of this Calendar. Also, students are advised to obtain a copy of the Faculty of Graduate Studies Policy on Integrity in Scholarly Activity (available from the Dean's Office or on the Graduate Studies web site), as well as the regulations for thesis preparation and submission.

All students are expected to be able to write their theses (and indeed, all their papers) in excellent English (or whatever language is permitted, such as in the case of some theses in the foreign language departments). While editorial correcting occurs as part of the

supervisory process (as sections of the thesis are read and commented upon by Supervisory Committee members), faculty are not expected to have to make excessive correction to the standard of English. A committee member may refuse to read materials if they are not of an adequate standard of writing and expression for a graduate level programme. Supervisors should identify English problems early on, and ensure that the students take corrective measures, such as attendance at the university's Writing Workshops. These requirements can be made compulsory if the student's language deficiencies are problematic to the progress and success of the research.

Just as the academic content of the thesis must reflect the student's own work, so must the standard of writing and expression. While students are encouraged to make use of standard spelling and grammatical checkers within their word processing software, and indeed to have individuals proofread their papers and draft manuscripts, the use of "professional" editorial services (other than strict proofreading and formatting) is prohibited. The use of editorial services which provide substantive rewriting and/or improvement of the written English within a thesis is a form of academic fraud (similar to plagiarism) because it presents a standard of work that has not been achieved by the student, and is therefore giving a false impression of the quality of the student's work. If the use of any professional services (outside the University's Writing Workshops) is contemplated, students must consult with their supervisor and Graduate Coordinator before taking any action. If the Graduate Coordinator is in doubt, he/she should contact the Faculty Office for advice.

### 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 to the department for examination not later than March 16, for Spring Convocation, or August 24, for the Fall awarding of degrees. 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 programme 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 recognizes differences in the nature of theses within master's programmes (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 practising profession), may be appointed to the Supervisory Committee where their particular expertise makes it appropriate.

### 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 organize 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 programme or department, but preferably should be from outside the involved programme 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 graduate students of the home department and any other departments that would be specifically 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 programmes 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 programmes 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. The subject of the PhD thesis must be approved by the Faculty at least twelve (12) months before the date of final examination.

##### 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. 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 formal invitation to the external examiner is issued by the Faculty (see para. 6. 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 Office (two copies in the case of Interdisciplinary Ph.D. students), 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 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. 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 on an MS-DOS formatted disk in Word Perfect compatible format, or e-mailed 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 of 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. 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 below) 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. If the recommendation is not to proceed, then the external will be asked to identify what would be required to make the thesis acceptable, and to return the thesis and cease any further involvement with the process unless otherwise contacted by the Faculty of Graduate Studies.
7. In consultation with the Chairperson of the Department, the Graduate Co-ordinator, and the research supervisor, the Faculty will establish a time and place for the examination.
8. The external examiner will submit by mail a constructively critical and analytical report (the Examiner's Report) to the Graduate Studies Office at least one week prior to the scheduled date of the defence, who will send a copy to the department Chair or Graduate Co-ordinator. As stated in para. 6 above, 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 (however, see para. 9. below). Normally the external examiner will attend the defence, but in the rare event of the external examiner not attending, the 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. 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.

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 Co-ordinator 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 will have to 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.
10. If the external 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. 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 programme. 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 (either the chairperson of the department or a designate) may also be included as a 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 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 four copies) to the Graduate Studies Office, students will present a cheque for \$100.00\* payable to the Faculty of Graduate Studies, Dalhousie University. This sum will cover the cost of binding. An additional charge will be made (where appropriate) to cover mailing costs.

The Faculty Office 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.

\* Binding cost is subject to change without notice

## X. Convocation

Convocation ceremonies are held in May and October.

#### 10.1. Letter of Confirmation for Completion of Degree

When a student has fulfilled all the requirements (including payment of all programme 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. A small administrative fee (\$5 at the time of writing) will be charged.

#### 10.2 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.

#### 10.2 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 (First Prof.): White/two parallel stripes of red corded border
- MArch (Post-Prof.): White/vermillion border
- MASc: Blue/gold border with white piping
- MASc/MURP: Peacock blue/gold border with white piping
- MCSc: Emerald green/gold border with white piping
- MEC: 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  
 MITE: Teal Green/white border with gold satin piping  
 MLIS: Mid-forest Green silk  
 MMM: Navy silk/seagreen border  
 MN: Apricot silk  
 MPA: Sky Blue silk  
 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 (DalTech): 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. Awards on Graduate Transcripts

A select number of Dalhousie Scholarships/Awards are recorded on the students official Dalhousie transcript. They are:

- Killam and Honorary Killam Scholarships,
- Eliza Ritchie and honorary Eliza Ritchie Scholarship,
- J. R. Johnston and honorary J. R. Johnston Scholarship,
- Governor General's Gold Medal.

An official letter confirming other Dalhousie scholarships (e.g. Dalhousie Graduate Scholarships) can be obtained upon request from the Faculty of Graduate Studies Office. An administrative fee of \$5.00 will be charged.

## XII. Appeals

Faculty and departmental decisions are subject to the normal appeals procedures which begin with the Department, School or College and then forwarded to the Dean for approval. Faculty and University regulations take precedence and cannot be overturned by an appeal at a lower level.

If still unresolved, the student may appeal to the Faculty of Graduate Studies Appeals Committee.

The grounds for appeal are limited to the following:

1. procedural unfairness;
2. bias; or
3. irregularity in procedure or marking.

Students appealing to the Faculty must provide the following documents:

- a) a letter of circumstance describing the problem and what you would like to happen
- b) a letter from the class instructor (if appropriate)
- c) a letter from the Graduate Coordinator/Chair of the department
- d) in a case of illness, a letter from a doctor indicating (i) when the illness was diagnosed, (ii) what effect the illness has on the student's class performance, (iii) assessment of student's ability to complete the class requirements ever, and (iv) what special aids are required, if any.

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

## XIII. Combined MD/PhD Programmes

The combined programme is offered to students as a means of expanding career opportunities and to contribute to the training of a new generation of scientifically trained clinical research workers.

The programme will be offered in the following Faculty of Graduate Studies departments: Anatomy and Neurobiology, Biochemistry, Microbiology and Immunology, Pathology, Pharmacology and Physiology/Biophysics. See individual departmental listings for more information.

Students must apply to both programmes in the same year (satisfying entrance requirements in both Faculties). The student will register for the first two years of the combined programme full-time MD and part-time PhD (paying fees for the MD programme only). During this time, the student is expected to develop a PhD thesis proposal and initiate research. The following two years (if accepted with a Master's degree), 3 years (if accepted without a Master's degree) the student will be granted a leave of absence from Medicine and register full-time PhD paying full graduate studies fees, devoting all of his/her time to the PhD programme. During the time the student is registered full-time graduate studies it is expected that the thesis research will be completed and the thesis written and defended.

In the following years until completion of the MD, the student will register full-time MD and, if necessary, part-time PhD (paying only MD fees). In some instances it might be possible to combine the latter stages of the PhD (thesis writing and defence) with the final years of the MD. Should the student complete the MD requirements before completing the PhD he/she must register with the Faculty of Graduate Studies paying an appropriate fee.

It is anticipated that this concurrent programme could result in a significant saving of time for any students contemplating both degrees.

## XIV. Departmental Listings

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

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

Each Departmental 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 programme. Other particular requirements may be listed.
4. A description of degree programme requirements includes:
  - (a) Minimum time required to complete the programme
  - (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.

# Agriculture

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Location: Nova Scotia Agricultural College  
Truro, NS B2N 5E3  
Telephone: (902) 893-6360  
Fax: (902) 897-9399

## Professors

Adsett, J., BSc (Agr) (McGill), MScE (UNB), PhD (Sask), Engineering Department. Automated Monitoring, Machine Design & Development, Environmental Concerns, Aquifer Thermal Energy Storage.

Anderson, D.M., BSA, MSc (Man), PhD (Sask), Agricultural Sciences Department. Nutrition and Metabolism of the monogastric Species; Swine, Fin Fish, Poultry, Management of Swine, Head.

Asiedu, S., BSc (Agr), MSc, PhD (McGill), Agricultural Sciences Department. Plant-microbe Interactions, Post-Harvest Physiology/Pathology of Horticultural Crops, Potato Physiology, Production Management.

Caldwell, C.D., BSc (MtA), MSc (Dal), PhD (East Anglia), Agricultural Sciences Department. Crop Physiology, Carbon & Nitrogen Assimilation, Water Relations, Cereals & Oil Seeds Management.

Crober, D.C., BSc (Agr), MSc (McGill), PhD (UBC)

Farid, A., BSc (Bishops), MSc (Shiraz), PhD (Alta), Agricultural 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), Agricultural Sciences Department. Dairy Systems, Nutrition, Sustainable Agriculture, Modelling, Pasture, and Milk Composition.

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

Ju, H.Y., BSc (Agronomy) (Seoul), MSc, PhD (McGill), Agricultural Sciences Department. Fruit Crops, ginseng, mushrooms, growth regulators, cold hardiness, embryo development.

Le Blanc, J.-P., BA (Montreal), BSc (Quebec), PhD (McGill), Environmental Sciences Department. Integrated pest management, insect ecology and taxonomy.

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

Nowak, J., MSc, PhD, PhD Hab (Olsztyn), Agricultural Sciences Department. Forage legumes, plant stress physiology, test tube ecophysiology, utilization of beneficial microorganisms, potatoes tissue culture.

Olson, A.R., BA (Augustana), MSc (Wisconsin), PhD (Alta), Environmental Sciences Department. Botany. Systematic embryology of angiosperms, floral biology and angiosperms with unusual modes of nutrition. Head.

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

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.

Tenessen, T., BSc, MSc, PhD (Alta), Agricultural Sciences Department. Applied ethology, domestic animal behaviour, animal welfare, design of housing for farm animals.

Warman, P.R., BSc (Agr) (Rutgers), MSc, PhD (Guelph), Environmental Sciences Department. Soil fertility, composting research & sustainable agriculture.

## Assistant Professors

Goodyear, S.N., BSc (Agr) (McGill), MSc, PhD (Guelph), Agricultural Sciences Department. Vegetable production management and cultivar evaluation, physiology of vegetable crops.

## Associate Professors

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

Atlin, G., BSc (Agr), MSc (Guelph), PhD (Iowa), Agricultural Sciences Department. Plant breeding, quantitative genetics.

Brewster, G., BA (Hon), MSc, PhD (Western), Environmental Sciences Department. Soil conservation, spatial variability and human impact assessments.

Crowe, 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.

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

Gordon, R.J., BSc, MSc (McGill), PhD (Guelph), Engineering Department. Wastewater and manure management, water quality, air quality and odour management, constructed wetland systems, climate change.

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

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

Martin, R.C., BA, MSc (Carleton), PhD (McGill), Agricultural Sciences Department. Forage agronomy and sustainable agriculture, multiple cropping systems, rotational grazing.

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

## Research Professors

Cattani, D.J., BSc (Agr), MSc (Manitoba), PhD (Wageningen), Environmental Sciences Department. Turfgrass management, development and breeding. Plant improvement, turf growth and establishment and management to enhance winter survival of turfgrass species.

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

Percival, D., BSc (Agr), MSc, PhD (Guelph), Environmental Sciences Department. Lowbush blueberry, plant nutrition, regulation and water relations, carbon assimilation and metabolism.

Rouvinen-Watt, K., BSc, MSc, PhD (Kuopio), Agricultural Sciences Department. Fur Animal Nutrition and Management. Nutrient digestion and excretion in carnivores, feedstuff utilization, feed quality and fur growth cycle.

Wang-Pruski, G., BSc (Tian Jin), PhD (Alberta), Agricultural Sciences Department. Potato biotechnology, metabolic regulation of after cooking darkening, potato genetics and tuber physiology.

## Adjunct Professors

Benchaar, C., MSc (Algiers), PhD (Toulouse)

Boiteau, G., BSc, MSc (Laval), PhD (N.Carolina)

Eaton, L.J., BSc (Acadia), MSc, PhD (Dal)

Papadopoulos, Y.A., BSc, MSc, PhD (Guelph), Agriculture Canada

Prange, R.K., BSc (Acadia), MSc (BC), PhD (Guelph)

Silversides, F., BSA (Sask), MS (Mass), PhD (Sask)

Singh, R.P., BSc (Agr), MSc (Agr) (Agra Univ), PhD (N. Dakota)

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 Programme

Formally approved in the Spring of 1993, the Master of Science in Agriculture represents a unique co-operation between Dalhousie University and the Nova Scotia Agricultural College.

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 programme of study.

Graduate students attend classes at the Nova Scotia Agricultural College and, on occasion, supplement their programme 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, Botany, Plant Pathology  
Agricultural Chemistry: Food Science, Agricultural Chemistry  
Soil Science: Soil Chemistry, Nutrient Management, Soil Fertility, Geology, Composting and Waste Management, Drainage, Irrigation, Water Table Management, Water Quality  
Animal Science: Nutrition, Animal Behaviour, Genetics and Breeding, Animal Product Technology, Physiology, Animal Management, Aquaculture  
Plant Science: Crop Physiology, Plant Breeding, Plant Biotechnology, Crop Management, Agronomy

The MSc in Agriculture programme 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 the graduate class AGRI 5700.03 Communication Skills and Graduate Seminar.

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 programme.

## II. Classes Offered

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

Classes marked with an asterisk (\*) are offered in alternate years. 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: 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 behaviour of herbicides in plants, environmental fate of herbicides, myco-herbicides, biorationals. Two term projects and a research critique will be required.

INSTRUCTOR: 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: 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:

- 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,
- 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,
- give a seminar to the class on their term paper topic.

INSTRUCTOR: G. Stratton  
CROSS-LISTING: B400  
FORMAT: Lecture 3 hours, lab 4 hours

### 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.

INSTRUCTORS: 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 to 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: J.--P. Le Blanc  
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 behaviour, environmental enrichment, social dynamics of livestock, early rearing environment and the effect on later behaviour.

INSTRUCTOR: 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.

INSTRUCTORS: D. Anderson, A. Fredeen  
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: L. MacLaren  
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: Animal Science 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: 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.

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, will be presented and relevant literature will be surveyed. Reference will be made throughout to performance recording programs used in Canada and throughout the world.

INSTRUCTOR: 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: 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: P. Warman  
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: J. Hoyle  
FORMAT: Lecture 3 hours

### **\*AGRI 5440.03: Organic Environmental Analysis.**

(Next offered in 2002-2003)

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:

- To write a major paper on an important topical issue.
- To present that paper as a seminar before Departmental faculty, staff & students.
- To write a research proposal prior to starting the laboratory project.

INSTRUCTOR: J. Hoyle  
FORMAT: Lecture 3 hours, labs 4 hours  
CROSS-LISTING: CS420

### **\*AGRI 5450.03: Environmental Soil Chemistry.**

(Next offered in 2001-2002)

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: P. Warman  
FORMAT: Lecture 3 hours, labs 4 hours  
CROSS-LISTING: CS440

**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.

INSTRUCTORS: 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.

INSTRUCTORS: N. Crowe, G. Stratton  
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.

INSTRUCTORS: G. Atlin, Y. Papadopoulos  
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.

INSTRUCTORS: G. Atlin, Y. Papadopoulos  
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: R.C. Martin  
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.

INSTRUCTORS: C.D. Caldwell, S.K. Asiedu, N. Goodyear, R.C. Martin  
FORMAT: Lecture 3 hours

**\*AGRI 5560.03: Advanced Crop Physiology.**

Physiological processes relevant to crop plant development and production of harvestable yield will be examined.

INSTRUCTOR: 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: J. Nowak  
FORMAT: Lecture 3 hours

**\*AGRI 5580.03: Plant Biotechnology.**

(Next offered in 2002-2003)

Theoretical bases of plant tissue culture, overview of the organization and operation of a tissue culture laboratory and tissue culture techniques and their application to nuclear seed potato production, multiplication of horticultural crops and landscape plant material, production of secondary metabolites, germplasm development and plant breeding and conservation of genetic resources. Outline of the techniques of manipulation of plant genome will also be a part of this class. Students must complete an assigned project.

**THIS CLASS HAS LIMITED ENROLLMENT**

INSTRUCTOR: J. Nowak  
FORMAT: Lecture 3 hours, labs 4 hours  
CROSS-LISTING: PS475

**\*AGRI 5590.03: Biotechnology in Agriculture - Opportunities, Issues and Choices.**

(Next offered in 2001-2002)

The main focus of this class will be an overview of current developments in the application of biotechnology techniques to agriculture and related fields and their impact or potential impact on plant and animal production, food and feed quality and bioresource and waste management. Seminars and class discussions will also address socio-economic, environmental and ethical considerations. Guest speakers and the general public will contribute to the seminars and class discussions. Graduate students will be expected to give one additional seminar (three seminars per student), chair one discussion topic (including introduction of a guest speaker and facilitation of class discussion) and write a summary of the discussion as an essay. The essay will require preparation of an up-to-date literature review and critical evaluation of the discussion per se.

INSTRUCTOR: J. Nowak  
FORMAT: Two lectures and 3 seminars per week  
CROSS-LISTING: IN475

**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, colour) and microbiology (spoilage, pathogenic organisms, modified-atmosphere packaging, HACCP). Each student will be expected to present a review of a particular topic.

FORMAT: Lecture 3 hours

**\*AGRI 5620.03: Ruminant Digestive Physiology & Metabolism.**

(Next offered in 2002-2003)

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: A.H. Fredeen  
PREREQUISITE: AS300, AS305, CS360  
FORMAT: Lecture 3 hours, lab 2 hours

**AGRI 5630.03: Intermediate Statistical Methods.**

Analysis of single-factor experiments, randomized blocks, latin squares, factorial and two-level fractional factorial designs.

INSTRUCTOR: T. Astatkie  
PREREQUISITE: MP210, MP211 or permission of the instructor  
FORMAT: Lecture 3 hours, lab 1 hour  
CROSS-LISTING: MP420

**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 Programme.

INSTRUCTOR: R. Gordon

FORMAT: Lecture 2 hours

**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 5705.03: Graduate Module Class II.**

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 programme.

INSTRUCTOR: T. Astatkie

FORMAT: Lecture 3 hours

PREREQUISITE: MP420 or equivalent

**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

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Location: Sir Charles Tupper Medical Building, 13th Floor  
Halifax, NS B3H 4H7  
Telephone: (902) 494-6850  
Fax: (902) 494-1212  
e-mail: anatomy@is.dal.ca  
Website: http://www.anatomy.dal.ca

## Head of Department

Hopkins, D.A.

## Professors

Currie, R.W., BSA, MSc, PhD (Man), Graduate Studies  
Coordinator. Heat shock proteins and protection of heart and brain  
Dickson, D.H., BA, MSc, PhD (Western), Retinal cell biology;  
Structural and functional studies of the retina and retinal pigment epithelium  
Hopkins, D.A., BSc (Alta), MA, PhD (McMaster), Anatomy and function of the autonomic nervous system  
Neumann, P.E., BA, MD (Brown), Development neurogenetics, pattern formation and experimental neuropathology  
Rutherford, J.G., BA (Cornell), MS (Syracuse), PhD (SUNY), Subfornical organ regulation of blood pressure  
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

Hagg, T., MD (Leiden), PhD (UCSD), Neurotrophic factors and CNS recovery  
Hansell, M.M., BSc (Toronto), PhD (Calif)  
Mendez, I., MD, PhD (Western), Neural transplantation in the mammalian CNS  
Mobbs, I.G., BSc (Aberdeen), MSc (McMaster), PhD (Western), Kidney structure and function  
Morris, S., BSc (Victoria), MD (Ottawa), MSc (Toronto), Anatomy and physiology of surgical skin and muscle flaps  
Smith, F.M., BSc, MSc, PhD (UBC), Autonomic control of the circulation

## Assistant Professors

Allen, G.V., BSc, PhD (Dal), CNS responses to ischemia and pain  
Baldrige, W.H., BSc (Toronto), PhD (McMaster), Structure and function of the vertebrate retina  
Clarke, D., MDCM, PhD, FRCSC (McGill), Neuronal survival and regeneration following injury in the central nervous system  
Darvesh, S., MD (Dal), PhD (UNB), FRCP (C) (Dal), Synthetic chemistry of neurogenerative disorders  
Mathieson, W.B., MSc (Carleton), PhD (Ottawa), Thermoregulatory control in metamorphic Anurans

## Adjunct Professors

Tasker, R.A.R., BSc, MSc, PhD (Queen's)

## Lecturer

Sinha, G., MBBS (Banaras)

The Department of Anatomy and Neurobiology provides facilities for advanced study and research in Neuroscience, Histology, Embryology, Cell Biology and Evolutionary Biology.

## 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 programme. Others apply for the MSc programme, with option to transfer to the PhD programme after one year, contingent upon the recommendation of student's advisory committee.

The content of this year of study will be recommended by the Department of Anatomy and Neurobiology Graduate Studies Committee.

### B. Master's degree holders in a biological science

May apply for direct admission to PhD programme.

### C. Medical graduates

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

All students entering the MSc programme are expected to advance to the PhD programme.

## II. Degree Programmes

### 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 Department of Anatomy and Neurobiology Graduate Studies Committee at the beginning of the first year. Students must fulfill a minimum of one credit of required classes or more 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 programme during each full year of training. The acquisition of teaching skills is an integral part of the programme. 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 class of his/her training. Students are also expected to spend 4-6 months in another laboratory to perform research that can be included in their thesis.

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

Financial assistance is available for qualified candidates for no more than four years.

#### Evaluation

Students will submit a research proposal to their Advisory Committee by the end of the first year. Students who were admitted without an MSc degree are required to pass a qualifying (written and oral) exam at the end of the second year.

All PhD candidates must pass a preliminary examination during the third year, but 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 committees will be selected by the student's Advisory Studies Committee after consultation with the candidate's 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)

The minimum residency requirements for the MSc degree are as indicated in the Faculty of Graduate Studies regulations.

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 programme during each year of training. Classes are decided through consultation with the student, research supervisor and the Department of Anatomy and Neurobiology Graduate Studies 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. Consent of the instructor is required for admission into each class. Normally, 24 months (2 years) are necessary to complete all requirements for the MSc degree.

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

Financial assistance is available for qualified students for no more than two full years.

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

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

### **D. Doctor of Philosophy with Doctor of Medicine (combined MD/PhD)**

For information on the combined MD/PhD programme see "Interdisciplinary and Joint Programmes".

## **III. Classes Offered**

Students take one of the following required classes:

### **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.

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.

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.

COORDINATOR: M.M. Hansell

### **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, and 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 diencephalon 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 and are expected to submit a term paper on a topic agreed upon in consultation with the instructor.

COORDINATOR: K. Semba

### **ANAT 5160X/Y.09: Human Gross Anatomy.**

This class is offered over three terms and is designed to introduce students to the gross anatomy of all regions of the human body. Part I is an overview of anatomy given with medical students. Part II emphasizes the functional anatomy of the upper and lower limbs and back respectively and is given as a dissecting class with tutorials. Part III covers the head and neck in a similar fashion. In

addition, students will select a topic to present. A faculty advisor will be assigned to assist students with the study of each major region of study. Tutorials are offered on a regular basis. Student presentations of regional anatomy and its application to common clinical problems are an important component of the programme. Enrollment is limited to 8 students with first consideration given to graduate students within the Department of Anatomy and Neurobiology.

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.

COORDINATOR: I.G. Mobbs

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

(Limited to Anatomy and Neurobiology students; required)

This class is designed to acquaint first year graduate students with the theoretical and practical aspects of research techniques in Anatomy and Neurobiology. Lecture and laboratory sessions will be provided by all Faculty members. Participation in this class will be required of and restricted to first year Anatomy and Neurobiology graduate students. Students will be evaluated on their participation and written critiques of research techniques used in relevant manuscripts by the respective Faculty members.

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.

COORDINATOR: W. Baldrige

## **Electives**

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

### **ANAT 5041.03: Light Microscope Techniques.**

The aim of this class is to teach both theoretical and practical aspects of light microscopy used in anatomical research. Brightfield, darkfield, interference, polarizing and fluorescence microscopical techniques are learned as well as tissue preparation, paraffin and freezing immunocytochemistry, autoradiography and neuronal staining methods.

### **ANAT 5042.03: Electron Microscope Techniques.**

This class, similar to ANAT 5041.03, will teach theoretical and practical aspects of transmission and scanning electron microscopy. The use of image analysis to quantify ultrastructural data will be demonstrated. Students will prepare tissue for ultrastructural analysis and operate the electron microscopes to produce research-quality micrographs of their work.

### **ANAT 5060.03: Neurobiology of Neurological Disorders.**

This class is designed to acquaint the student with a variety of neurological disorders and develop familiarity with disease-oriented basic research. Classes are given every other week during winter and spring and consist of a one-hour lecture covering neuroanatomy, neurochemistry, cell biology, etiology and existing treatments of one disease per session (e.g. ischemia, Alzheimer's and Parkinson's disease, ALS, MS, spinal cord injury, genetic disorders, peripheral nerve disorders, cancer, etc.). The lecture is followed by a half to one hour discussion of recent important basic research developments and potential future directions for which the students will prepare a literature search and read relevant publications. At the end of the class, students are expected to prepare a short grant proposal to an imaginary "Disease" Foundation, based on their own research.

NOTE: A minimum of 5 students is required to offer this class.

COORDINATOR: T. Hagg

CROSS-LISTING: NESC 5060.03

### **ANAT 5062.03: Autonomic Regulation: Central Mechanisms**

This class will acquaint students with the principles for the organization and neurobiological mechanisms governing the central nervous system regulation of autonomic functions. The class will begin with an introduction to the basic neuronal mechanisms and neuroanatomical basis for central regulation common to all

autonomic systems. This will be followed by the presentation and discussion of specific examples of the regulation of individual organ systems. The central origins of patterned neural activity and reflex pathways will be examined for each system. The format of the class will be a combination of lecture, discussion of original research reports and student presentations on selected topics. Students will be evaluated based on the instructor's assessment of participation in class discussions (50%) and oral presentation (50%)  
CROSS-LISTING: NESC 5062.03

### **ANAT 5063.03: Neurobiology of the Peripheral /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  
CROSS-LISTING: NESC 5063.03

### **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 4070.03

### **ANAT 5090.03: Cellular Development in the Nervous System.**

This class explores the events and principles of development in the vertebrate nervous system. The class consists of readings and weekly tutorial/discussion periods of 2 hours. Textbooks required. Evaluation is based on participation in discussion (50%) and weekly one-page written critiques of student-selected papers in the relevant literature (50%). Duration of the class is 14 weeks. This class will be offered in alternate years.

### **ANAT 5120X/Y.06: Human Embryology.**

The student learns descriptive human prenatal development from Moore's, *The Developing Human*, from certain medical and dental lectures and labs, from reading assignments, from special dissections of the placenta and fetus and from a weekly tutorial. The experimental aspect of the subject is achieved by means of an essay and a project. The prerequisites for this class are a knowledge of gross anatomy and histology.  
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.  
PREREQUISITE: ANAT 5150.03 and 5160.09, an equivalent or the consent of the instructor.  
COORDINATOR: M.M. Hansell

### **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 5609.03: Anatomical and Molecular Neuropharmacology of the Basal Ganglia: The Scientific Basis for Grafting and Neural Transplantation.**

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  
CROSS-LISTING: PHAC 5609.03  
ENROLLMENT: Graduate Students in Neuroscience, post-doctoral fellows and residents in post-graduate programmes in the Faculty of Medicine

### **ANAT 9000.00: MSc Thesis**

### **ANAT 9530.00: PhD Thesis**

# Architecture

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Location: 5410 Spring Garden Road  
Halifax, NS B3J 1E7  
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## Dean, Faculty of Architecture

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## Director, School of Architecture

Rousseau, J., BArch (Montreal)  
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## Administrative Assistant to the Dean

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## Departmental Secretary - Architecture

Morash-Kent, S., BA, BEd, MEd (SMU)  
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## Co-op Coordinator for Architecture

Costello, P., BEDS, BArch (TUNS), NSAA  
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## Introduction

The Faculty of Architecture includes the School of Architecture and the Department of Urban and Rural Planning. The Faculty's degree programmes are primarily for individuals who intend to become professional architects or planners. The Faculty also offers several classes that are open to all students in the university, as well as undergraduate and graduate classes that may be taken with permission from the instructor. Architecture classes and programmes, including the undergraduate component, are described in this section. Planning classes and programmes are described in the "Urban and Rural Planning" section of this calendar.

## Professors Emeriti

Biskaps, O., BArch (Toronto), MArch (Florida), FRAIC  
Jackson, A., DiplArch (Poly London), ARIBA

## Professors

Baniassad, E., BArch (Illinois), MA, PhD (Manchester), FRAIC, FAIA (Hon.), ARCUK. Architectural design, theory and education, as applied in the fields of design of education programs, design of public buildings, and international development.

Emodi, T., BArch (Melbourne), MES (York), NSAA. Use of computers in design with a particular interest in projects to improve health of individuals, communities and the environment.

MacKay-Lyons, B., BEDS, BArch (TUNS), MArchUD (UCLA), NSAA.

Private practice design work in private homes, urban design, public buildings, and artificial intelligence software design.

Procos, D., BArch (MIT), MArch (Pratt), NSAA, MCIP. Energy issues in the built environment, such as passive solar heating, in rural and urban settings ranging from the metropolitan to the single building.

Rousseau, J., BArch (Montreal). Landscape, urban and architectural issues in the teaching and practice of architecture; contracts, competitions and other means to enhance research in architecture.

Wanzel, J.G., BArch, MArch (Toronto). Human condition and the role of architecture in improving quality of life; especially the design and development of non-profit and co-operative housing; economic, social, and housing policy; and design studies of small towns and their territories.

## Associate Professors

Cavanagh, E., BSc, BArch (McGill). Architectural design, history of technology, vernacular building, and coastal planning.

Kroeker, R. BSc (Manitoba), AADipl, ARCUK. Building and culture; creating strategies for healthy, habitable structures which are responsive to the natural environment and contribute to a sense of community identity.

Macy, C., BA(Arch) (Calif. at Berkeley), MArch (MIT), OAQ. Design of public buildings and spaces, tourism, festival architecture and lightweight structures, as well as architectural history and criticism.

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

Parcell, S., BArch (Toronto), MArch (Cranbrook). History and theory of architectural representation, phenomenology and hermeneutics in architectural design, and cross-disciplinary studies.

## Assistant Professors

Bonnemaison, S., BSc (Concordia), BArch (Pratt), MSc(Arch) (MIT), PhD (UBC). Representations of nature in architecture, especially late 19th and early 20th-century American architecture.

Parsons, A., BSc (McGill), MES (Dal). Building performance; specializing in the development of sustainable user requirements, visualization techniques, and applied physical and computer modeling methods.

Savage, N., BA (Alberta), BEDS, MArch (TUNS), NSAA. Private practice: design of residential buildings, public buildings, and non-profit housing developments; architectural visualization and its graphic applications; Canadian building case studies.

## Lecturer

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

## Adjunct Professors

Cardew, P., DipArch (Kingston College of Art)

Salter, P., AADipl (Architectural Association)

Schmitt, D., BArch (Toronto)

## I. Introduction

The School of Architecture, which is part of the Faculty of Architecture 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 professional architects. The School's professional degree programme includes the two-year Bachelor of Environmental Design Studies degree and the two-year Master of Architecture (First Professional) degree. Most of the programme 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 programme 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 programme to the elective studies and design thesis of the graduate programme, 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

Following this emphasis on architectural design, one-third of the Architecture building is devoted to studio spaces that are open to Architecture students twenty-four hours a day. The building also has several computer labs with a wide array of equipment, as well as a fully-equipped woodworking shop, photographic facilities, and a large exhibition hall. The Sexton Campus Library's Architecture collection is located nearby.

## Co-op Work Terms

The School's professional degree programme includes two work terms that provide students with practical experience in building design and responsible professional practice. The School's Co-op Programme has been operating since 1970, and the University'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 Austria, Bahamas, Barbados, Bermuda, Botswana, Chile, Croatia, Czech Republic, England, France, Germany, Hong Kong, Indonesia, Japan, Lebanon, Malaysia, Mexico, Netherlands, Netherlands Antilles, Norway, Poland, Portugal, Scotland, South Africa, Spain, Switzerland, Taiwan, Uganda, United Arab Emirates, and the United States.

## Accreditation

The School's professional degree programme is fully accredited by the Canadian Architectural Certification Board. The entire six-year programme consists of two years of undergraduate study at a recognized 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 [First Prof.]).

In Canada, all provincial associations recommend a degree from an accredited professional degree programme as a prerequisite for licensure. The Canadian Architectural Certification Board (CACB), which is the sole agency authorized to accredit Canadian professional degree programmes in architecture, recognizes two types of accredited degrees: the Bachelor of Architecture and the Master of Architecture. A programme 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 programmes 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, recognized 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 (First Prof.) programme 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 Faculty of Architecture offers several classes that are open to all students in the university:

- ARCH 1000X/Y.06 Introduction to Architecture
- ARCH 3101.04 Survey of Western Architecture I
- ARCH 3102.04 Survey of Western Architecture II
- ARCH 3103.04 History and Theory of Modern Architecture
- ARCH 4101.04 History and Theory of Modern Architecture

Some classes in the School's ARCH 4000 and ARCH 6000 series, as well as the Department of Urban and Rural Planning's PLAN 6000 series, may be open to students from other faculties and universities, with the permission of the instructor. Graduate classes also require approval from the Faculty of Graduate Studies. 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 Programme

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

### Bachelor of Environmental Design Studies

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

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

## IV. Undergraduate Admission Requirements

### A. Admission Criteria

Each September, approximately fifty students are admitted into the BEDS programme. The Admissions Committee gives priority to applicants with a combination of academic performance and creative ability. Well-rounded personal and academic experience is beneficial, as well as experience in drawing, craft, and computer applications.

### B. Minimum Academic Requirements

The minimum academic requirements for admission to the programme are:

- Two years in a university degree programme (normally, ten full-year classes), with a minimum 2.5 grade point average;
- A full-year university class in mathematics. Calculus is recommended, but a math-based class in physics, economics, engineering or statistics may be acceptable. To confirm that a class is acceptable, its description may be faxed or mailed to the Architecture office.

### Post-Secondary Institutions

The Admissions Committee may grant up to one year of university credit for an applicant who has attended a post-secondary institution that is not considered a university. Two or more years at a college or an institute of technology plus one year of university normally is acceptable as a minimum.

### Mature Students

An application will be considered from a Mature Student - an individual who will be at least 25 years old at the time of registration in the BEDS programme and does not meet the minimum academic requirements for admission (two years of university, mathematics class, 2.5 GPA). In the application, a Mature Student should describe related work experience, and any other pursuits and skills that may serve as grounds for admission. A portfolio of creative work and any post-secondary academic transcripts also must be submitted.

### Transfer Students

The School of Architecture welcomes applications from transfer students from other architecture schools in Canada and abroad. Level of entry is based on classes completed elsewhere that are equivalent to required classes at Dalhousie, on the level of achievement in the design portfolio, and on the applicant's total years of university. To meet professional accreditation standards, the School cannot offer a level of entry that would permit a student to obtain the MArch (First Professional) degree with less than six full years of university.

### C. Documents

A BEDS applicant must submit all of the following items 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
  - A completed application form;
  - The appropriate application fee.
- 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
  - An official academic transcript from all previous post-secondary institutions;
  - A portfolio of work (about 10-15 items) that demonstrates creative ability and/or artistic skill. The portfolio may include free-hand sketches, precision drawings, paintings, furniture, sculpture, craft objects, creative photography, construction projects, etc. 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.
  - A letter written by the applicant, describing his/her interest in architecture and in the BEDS programme, and giving the Admissions Committee a sense of the applicant as a person: aspirations, interests, reading, travel, recreational activities, etc.
  - Two letters of recommendation, including at least one from an academic instructor with close personal knowledge of the applicant's academic background.
  - Evidence of competency in English for applicants whose native language is not English.

### D. Application Deadline

The deadline for applications from North America is June 1, but late applications may be considered up to August 1. An early response will be given to an application arriving by March 1. The deadline for non-North American applications is April 1. Applications from transfer students are considered throughout the year.

## V. Undergraduate Regulations

For academic regulations that apply to undergraduate students in the School of Architecture (including workload, class changes, withdrawal, transfer credits, extramural classes, part-time studies, duration of undergraduate studies, minimum degree requirements, assessment, incomplete class work, reassessment of a grade, and academic standing), please refer to the undergraduate calendar. Please note that some undergraduate regulations differ from their graduate counterparts.

## VI. Undergraduate Classes Offered

### A. Professional Degree Programme

The following chart illustrates the distribution of terms throughout the four years of the professional degree programme in the School of Architecture. The first two years are Bachelor of Environmental Design Studies and the final two years are Master of Architecture (First Professional).

	Fall	Winter	Summer
BEDS - Year 1	B1 (academic term)	B2 (academic term)	B3 (academic term)
BEDS - Year 2	B4 (work term)	B5 (academic term)	B6 (academic term)
MArch - Year 1	M1 (academic term)	M2 (work term)	M3 (work term)
MArch - Year 2	M4 (academic term)	M5 (academic term)	

### B. Bachelor of Environmental Design Studies

#### Year 1 - Term B1 (Fall)

- ARCH 3001.06 Design
- ARCH 3004.02 Communication
- ARCH 3101.04 Survey of Western Architecture I
- ARCH 3201.03 Construction and Structures
- ARCH 3204.01 Environment
- ARCH 3301.01 Professional Practice

#### Year 1 - Term B2 (Winter)

- ARCH 3002.06 Design
- ARCH 3005.02 Communication
- ARCH 3102.04 Survey of Western Architecture II
- ARCH 3202.03 Construction and Structures
- ARCH 3205.01 Environment

#### Year 1 - Term B3 (Summer)

- ARCH 3003.06 Design
- ARCH 3006.02 Communication
- ARCH 3103.04 History and Theory of Modern Architecture
- ARCH 3203.03 Construction and Structures
- ARCH 3206.01 Environment
- ARCH 3302.01 Professional Practice

#### Year 2 - Term B4 (Fall)

- ARCH 8891.01 Professional Practice (Co-op Work Term)

#### Year 2 - Term B5 (Winter)

- ARCH 4001.08 Design
- ARCH 4101.04 History and Theory of Modern Architecture
- ARCH 4201.04 Building Systems Interface
- Elective

#### Year 2 - Term B6 (Summer)

- ARCH 4002.08 Design
- ARCH 4102.04 Architectural Research and Criticism
- ARCH 4202.04 Building Systems Interface
- Elective

#### Undergraduate Electives

- ARCH 4103.02 History and Theory of Housing
- ARCH 4104.02 History and Theory of Urbanization

- ARCH 4105.02 History and Theory of Building
- ARCH 4106.02 History and Theory of Landscape Architecture
- ARCH 4107.02 Architectural History
- ARCH 4108.02 Community Design
- ARCH 4109.02 Studies in Architectural Representation
- ARCH 4203.02 Innovation in the Building Industry
- ARCH 4204.02 Computers in Architecture
- ARCH 4205.02 Multimedia in Architecture
- ARCH 4302.02 Directed Studies in Professional Practice

For an undergraduate elective, a student may take a class offered by another Department or Faculty at Dalhousie University. The subject need not be directly related to architecture, and the class may be at any undergraduate or graduate level. With a Letter of Permission, a student may also take a class at another university, if the class is not available at Dalhousie University.

## VII. Undergraduate Class Descriptions

### Class Numbers

The first digit of an ARCH class number indicates its level: introductory classes open to all university students (1), Year 1 of BEDS (3), or Year 2 of BEDS (4). The second digit indicates the area of study: Design (0), Humanities (1), Technology (2), or Professional Practice (3). Classes in the BEDS programme have various credit-hour extensions (01-08) that indicate the approximate class hours each week and reflect the appropriate balance of subjects for professional accreditation. Classes may be interchanged between academic terms, depending on the availability of instructors. Not all elective classes (\*) may be offered each year. Please consult the academic timetable for current listings. Instructors are listed only for classes that may be available to students from outside the Faculty of Architecture.

### ARCH 100X/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.

FORMAT: Lecture/seminar

### ARCH 3001.06: Design.

This class introduces principles of architectural form and design. It focuses on elementary forms - the hut, the room and the pavilion - on the land and in the city. Projects include analyses of historical buildings and exercises in design.

FORMAT: Lecture/studio

RESTRICTION: BEDS students

### ARCH 3002.06: Design.

This class continues ARCH 3001.06. The basic topic is the architecture of the house in the city, and its development throughout history.

FORMAT: Lecture/studio

RESTRICTION: BEDS students

### ARCH 3003.06: Design.

This class continues ARCH 3002.06. In the studio, students examine issues of building type, program and construction through the design of a small public building. In the field, student groups participate in design projects that may include on-site construction.

FORMAT: Lecture/studio

RESTRICTION: BEDS students

### ARCH 3004.02: Communication

This class introduces graphic skills and representational conventions for architectural design. Topics include line drawing, orthographic and axonometric projections, tonal drawing, and design presentation.

FORMAT: Lecture/studio

RESTRICTION: BEDS students

### ARCH 3005.02: Communication.

This class continues ARCH 3004.02. Topics include perspective construction, colour analysis, and the use of interpretive drawings/models to represent building characteristics and present design ideas. Studio work is done manually and with computer applications.

FORMAT: Lecture/studio

RESTRICTION: BEDS students

### ARCH 3006.02: Communication.

This class continues ARCH 3005.02. Topics include the use of computer applications for two-dimensional composition and three-dimensional modeling. The class also considers the integration of computer-aided design into architectural studio work.

FORMAT: Lecture/studio

RESTRICTION: BEDS students

### ARCH 3101.04: Survey of Western Architecture I.

This class introduces basic topics and interpretive methods in architectural research and history. Students investigate local, distant and historical buildings through direct experience and publications. Lectures focus on selected historical works and the role of the architect in the ancient and medieval eras.

INSTRUCTOR: S. Parcell

FORMAT: Lecture/seminar

### ARCH 3102.04: Survey of Western Architecture II.

This class studies architecture and the role of the architect from the renaissance to the beginning of the modern era in the late eighteenth century. Students investigate architectural treatises and significant buildings in Europe and North America in relation to their changing cultural and historical contexts.

FORMAT: Lecture/seminar

### ARCH 3103.04: History and Theory of Modern Architecture.

This class introduces major architects and buildings in Europe and North America from the mid-eighteenth century to the mid-twentieth century. It concentrates on recognized buildings representing influential lines of thought, placed in their cultural contexts. To develop skills in research and criticism, students investigate these buildings through primary and secondary sources, including articles, photographs and drawings.

INSTRUCTOR: T. Cavanagh

FORMAT: Lecture/seminar

### ARCH 3201.03: Construction and Structures.

The class provides an introduction to the construction process, examining the materials, methods and sequences of building construction as embodied in simple frame-built and mass-built buildings. It is taught through lectures and studio exercises, with reference to historic and contemporary built examples, as well as student projects in the design studio.

FORMAT: Lecture/studio

RESTRICTION: BEDS students

### ARCH 3202.03: Construction and Structures.

The class presents the principles of construction and structure as they relate to architecture. Methods of structural analysis are studied, including tools for the modeling and analysis of building structure. Building materials are studied in respect of their structural properties and their constructional implications. Principles of assembly and jointing are presented, and an analytical model for the study of building construction in terms of compound assemblies and the relationship between discrete assemblies is developed.

FORMAT: Lecture/studio

RESTRICTION: BEDS students

### ARCH 3203.03: Construction and Structures.

This class extends the study of structure to include statutory requirements and industry performance standards. More complex structural systems are examined, as well as the interaction of various forces and structural subsystems within a building, and the performance issues related to the selection of structural systems and materials are introduced. The study of building construction is extended to include the performance of materials in assemblies,

including the dynamic actions and weathering of building materials. The act of building is examined at the level of the construction detail, including performance of the building envelope.

FORMAT: Lecture/studio

RESTRICTION: BEDS students

#### **ARCH 3204.01: Environment.**

The principles and theories of electrical and light engineering are used to study light in architecture. Both natural and artificial sources are studied, quantified and discussed. The class concludes with an investigation of light-sensitive environments in architecture, such as art galleries.

FORMAT: Lecture

RESTRICTION: BEDS students

#### **ARCH 3205.01: Environment.**

The principles and theories of mechanical engineering are used to study heat in architecture. Both natural and artificial sources are studied, quantified and discussed. The class concludes with an investigation of heat-sensitive environments in architecture, such as laboratories.

FORMAT: Lecture

RESTRICTION: BEDS students

#### **ARCH 3206.01: Environment.**

The principles and theories of acoustics are used to study sound in architecture. Both natural and artificial sources are studied, quantified and discussed. The class concludes with an investigation of sound-sensitive environments in architecture, such as theatres.

FORMAT: Lecture

RESTRICTION: BEDS students

#### **ARCH 3301.01: Professional Practice.**

Topics in this week-long module include the architect and society; the political, social and economic environments in which architects practice; and an introduction to office organization and project management.

FORMAT: Lecture/seminar

RESTRICTION: BEDS students

#### **ARCH 3302.01: Professional Practice.**

Continuation of ARCH 3301.01.

FORMAT: Lecture/seminar

RESTRICTION: BEDS students

#### **ARCH 4001.08: Design.**

This class explores particular facets of architecture. Studio options are offered in topics such as housing, urban design, adaptive re-use of buildings, process of building, and environmental issues.

FORMAT: Lecture/studio

RESTRICTION: Year 2 BEDS students

#### **ARCH 4002.08: Design.**

This class involves the design of a major public building in an urban situation. The project encourages the integration of previous undergraduate studies in design, humanities and technology.

FORMAT: Lecture/studio

RESTRICTION: Year 2 BEDS students

#### **ARCH 4101.04: History and Theory of Modern Architecture.**

This class is a survey of twentieth-century modern architecture, with a focus on North America. Works are situated in their social and political contexts, and discussed in terms of theoretical constructs that influenced their development.

INSTRUCTOR: C. Macy

FORMAT: Lecture/seminar

#### **ARCH 4102.04: Architectural Research and Criticism.**

This class explores contemporary critical architectural discourse, with a focus on the ethical, social and political dimensions of architecture. Topics vary from year to year, but may include marxism, feminism, ecology, phenomenology and post-structuralist theory.

INSTRUCTOR: C. Macy

FORMAT: Lecture/seminar

PREREQUISITE: ARCH 3103.04, ARCH 4101.04 or equivalent

#### **\*ARCH 4103.02: History and Theory of Housing.**

This class compares significant historic housing schemes with contemporary examples. It focuses on historic examples such as the Weissenhof Exhibition, Le Corbusier's contribution to housing, Le Corbusier's imitators, and the work of Team X.

INSTRUCTOR: J.G. Wanzel

FORMAT: Lecture/seminar

RESTRICTION: BEDS students, or permission of instructor

EXCLUSION: PLAN 6111.03

#### **\*ARCH 4104.02: History and Theory of Urbanization.**

This class investigates urban form, theory and "urban experience" in the metropolis from the mid-eighteenth century to the present. Nineteenth- and twentieth-century urban design proposals which identified and proposed solutions to the problems of the industrial city are discussed and analyzed in terms of the social, historical and economic forces that shaped them.

FORMAT: Lecture/seminar

RESTRICTION: BEDS students, or permission of instructor

EXCLUSION: PLAN 6101.03

#### **\*ARCH 4105.02: History and Theory of Building.**

This class investigates materials and methods of production for buildings from the mid-eighteenth century to the present. Modern architecture is considered in relation to changes in the weight, strength, refinement and workability of building materials, and changes in convention, building assembly, reproduction and engineering theory.

FORMAT: Lecture/seminar

RESTRICTION: BEDS students, or permission of instructor

#### **\*ARCH 4106.02: History and Theory of Landscape Architecture.**

This 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.

INSTRUCTOR: S. Guppy

FORMAT: Lecture/seminar

RESTRICTION: BEDS students, or permission of instructor

EXCLUSION: PLAN 6108.03

#### **\*ARCH 4107.02: Architectural History.**

This class is a survey of a major period or personality in architectural history prior to the nineteenth century. The development of style is charted through an examination of the artistic and cultural phenomena that may have shaped it.

FORMAT: Lecture/seminar

RESTRICTION: BEDS students, or permission of instructor

#### **\*ARCH 4108.02: Community Design.**

This class is an overview of the theory and practice of community planning with emphasis on the physical organization of communities. Alternatives to indiscriminate urbanization are derived from a deeper understanding of the urbanization process. This involves technical studies of the urban fabric. At the same time, students further their understanding of the socio-economic context in which community planning operates, through analytic work in paper and seminar form.

INSTRUCTOR: D. Procos

FORMAT: Lecture/seminar

RESTRICTION: BEDS students, or permission of instructor

**\*ARCH 4109.02: Studies in Architectural Representation.**

This class examines critical issues in architectural representation and its history and theory. Topics may include intention, mode of representation, media, and geometry.

FORMAT: Seminar/studio

RESTRICTION: BEDS students, or permission of instructor

**ARCH 4201.04: Building Systems Interface.**

This class studies the interfacing of building technologies - structural, constructional and environmental systems. These studies are directly related on a consultancy basis to work that is on-going in the design studio. They enable the student to appreciate all the technical influences on architectural design and to develop an understanding of buildings as complex systems.

FORMAT: Lecture/studio

RESTRICTION: Year 2 BEDS students

**ARCH 4202.04: Building Systems Interface.**

Continuation of ARCH 4201.04.

FORMAT: Lecture/studio

RESTRICTION: Year 2 BEDS students

**\*ARCH 4203.02: Innovation in the Building Industry.**

This class studies innovation, the process of bringing invention into use, analyzed into components and made subject to rational control, with innovation in design and production processes the main concern.

FORMAT: Lecture/seminar

RESTRICTION: BEDS students, or permission of instructor

**\*ARCH 4204.02: Computers in Architecture.**

This class focuses on principles of computer-aided architectural design, involving representations of architectural form in 2D and 3D.

FORMAT: Lecture/seminar

RESTRICTION: BEDS students, or permission of instructor

**ARCH 4205.02: Multimedia in Architecture.**

This class examines the use of various technologies in visualizing, developing, and displaying multimedia presentations of architectural designs. It also considers how architectural design work may be informed by an effective use of multimedia.

INSTRUCTOR: P. Kelly

FORMAT: Lecture/seminar

RESTRICTION: BEDS students, or permission of instructor

EXCLUSION: ARCH 6105.02

**\*ARCH 4302.02: Directed Studies in Professional Practice.**

This class is a directed study, guided by an architectural practitioner, in architectural research related to her or his practice. The research project may be proposed by the practitioner, or by the student in consultation with the practitioner. The project outline must be approved by the chair of the Professional Practice teaching group.

RESTRICTION: BEDS students

**ARCH 8891.01: Professional Practice (Co-op Work Term).**

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. A student may apply to satisfy up to 500 hours of the time requirement through supervised research related to Professional Practice.

RESTRICTION: Year 2 BEDS students

## VIII. Graduate Degree Programmes

### A. Master of Architecture (First Professional)

Master of Architecture (First Prof.) is a two-year, full-time programme consisting of three 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 programme. 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, and computer applications. In the final year each student works on a design thesis, supervised by a faculty member.

### B. Master of Architecture (Post-Professional)

Master of Architecture (Post-Prof.) is a one-year programme for a student who already has obtained a professional degree in architecture. It may be taken through full-time or part-time study. A student focuses on a particular area of study, with supplementary studies in one or two other areas. In consultation with a faculty supervisor, each student assembles a programme of classes currently offered in the Faculty. General areas of study coincide with the various curriculum streams: Design, Humanities, Technology, and Professional Practice.

Two options are available for completing the MArch (Post-Prof.) programme:

- Eight half-credits of classes plus a MArch (Post-Prof.) Major Project equivalent to two half-credits.
- 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 programme for a student with an undergraduate degree in environmental design or a related field. It may be taken through full-time or part-time study. The programme is intended for a student who wishes to pursue graduate studies in a particular area of environmental design, but does not intend to become a professional architect or planner. In consultation with a faculty supervisor, each student assembles a programme of graduate classes currently offered in the Faculty. Depending on class availability, a student may major in a field such as urban studies, housing studies, or building performance.

Two options are available for completing the MEDS programme:

- Eight half-credits of classes plus a MEDS Major Project equivalent to two half-credits.
- Six half-credits of classes plus a MEDS Thesis equivalent to four half-credits.

## IX. Graduate Admission Requirements

### A. Minimum Academic Requirements

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

#### Master of Architecture (First Professional)

Admission is based on the applicant's design portfolio and academic record. A minimum of 4 ½ years (9 academic terms) of university is required, including architectural studies equivalent to the Dalhousie BEDS degree with a minimum B average. In assessing external applicants, the Admissions Committee looks for academic strengths in design, humanities and technology that are equivalent to standards at the end of the BEDS programme.

The Admissions Committee assesses transfer credits and recommends the level at which an applicant is eligible to enter the professional degree programme. 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. An applicant who is ineligible for Master of Architecture (First Professional) admission may be offered entry at an advanced level in the BEDS programme.

### Master of Architecture (Post-Professional)

An applicant must have a professional degree in architecture with high academic standing from a recognized university. Admission is based on the applicant's design portfolio, academic record and statement of intent, as well as the availability of an appropriate faculty supervisor.

### Master of Environmental Design Studies

An applicant must have an undergraduate degree with high academic standing from a recognized 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 programme. Admission is based on the applicant's academic record and statement of intent, as well as the availability of an appropriate faculty supervisor.

## B. Documents

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

- To be submitted to the Registrar's Office:  
Admissions, Registrar's Office  
Dalhousie University  
Halifax, NS  
B3H 4H6
  - application form (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.

- 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
  - application form (copies 2 and 3)
  - an official academic transcript from all previous post-secondary institutions;
  - 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. (A portfolio is optional for a MEDS applicant.)
  - a letter written by the applicant, describing his/her interest in architecture and in the chosen graduate programme, and giving the Admissions Committee a sense of the applicant as a person: aspirations, interests, travel, etc. An applicant for MArch (Post-Prof.) or MEDS must also provide a detailed statement of intent describing the area of study he/she intends to pursue.
  - two letters of recommendation, including at least one from an academic instructor with close personal knowledge of the applicant's academic background.
  - evidence of competency in English for applicants whose native language is not English (see Graduate Studies Admission Requirements in this calendar).

To confirm receipt of the items above, please contact the Architecture office: arch.office@dal.ca or (902) 494-3971.

## C. Application Deadline

The deadline for applications from Canada is June 1, but late applications may be considered up to August 1. An early response will be given to an application arriving by March 1. The deadline for non-Canadian applications is April 1.

# X. Graduate Regulations

## A. School of Architecture Regulations

In addition to the Faculty of Graduate Studies regulations in this calendar, the following regulations apply to graduate programmes in the School of Architecture.

### Part-Time Study

Part-time study is available in the MArch (Post-Prof.) and MEDS programmes, but not the MArch (First Prof.) programme.

### Retention of Student Work

All work executed at the School is the property of the School, and may be retained indefinitely for exhibition or other purposes. The School seeks to provide reasonable care for work retained and will return it to the author when it is no longer needed. This regulation does not in any way remove the intellectual property rights of students as authors of their work.

# XI. Graduate Classes Offered

## A. Master of Architecture (First Professional)

### Professional Degree Programme

The following chart illustrates the distribution of terms throughout the four years of the professional degree programme in the School of Architecture. The first two years are Bachelor of Environmental Design Studies and the final two years are Master of Architecture (First Professional).

	Fall	Winter	Summer
BEDS - Year 1	B1 (academic term)	B2 (academic term)	B3 (academic term)
BEDS - Year 2	B4 (work term)	B5 (academic term)	B6 (academic term)
MArch - Year 1	M1 (academic term)	M2 (work term)	M3 (work term)
MArch - Year 2	M4 (academic term)	M5 (academic term)	

### Year 1 - Term M1 (Fall)

- ARCH 5001.06 Design
- ARCH 5101.04 History and Theory of Cities
- ARCH 5301.01 Professional Practice
- Elective

### Year 1 - Term M2 (Winter)

- ARCH 5302.01 Professional Practice (Co-op Work Term)

### Year 1 - Term M3 (Summer)

- ARCH 5303.01 Professional Practice (Co-op Work Term)

### Year 2 - Term M4 (Fall)

- ARCH 9001X.08 MArch (First Prof.) Thesis
- ARCH 5201.04 Building Systems Interface
- ARCH 5304.01 Professional Practice
- Elective

### Year 2 - Term M5 (Winter)

- ARCH 9001Y.08 MArch (First Prof.) Thesis
- Elective

### Graduate Electives

- ARCH 6101.02 Housing Research Seminar
- ARCH 6102.02 Buildings in Perspective
- ARCH 6103.02 Topics in Urban Design
- ARCH 6105.02 Multimedia in Architecture
- ARCH 6106.02 Interdisciplinary Studies for Architecture
- ARCH 6107.02 Advanced Seminar in Humanities
- ARCH 6110.02 Advanced Seminar in Computer Applications
- ARCH 6113.02 Research Studies in Humanities
- ARCH 6116.02 Research Studies in Computer Applications
- ARCH 6201.02 Construction

- ARCH 6202.02 Innovations in Architecture and Building
- ARCH 6203.02 Advanced Seminar in Technology
- ARCH 6206.02 Research Studies in Technology
- ARCH 6301.02 Directed Studies in Professional Practice
- ARCH 6302.02 Advanced Seminar in Professional Practice
- ARCH 6303.02 Research Studies in Professional Practice
- ARCH 6401.02 Personal Project

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 advanced undergraduate level. 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 9002.08: MArch (Post-Prof.) Thesis

Other available classes are listed in the Master of Architecture (First Prof.) section above and in the Urban and Rural Planning section of this calendar.

### C. Master of Environmental Design Studies

ARCH 7002.04: MEDS Major Project

ARCH 9003.08: MEDS Thesis

Other available classes are listed in the Master of Architecture (First Prof.) section above and in the Urban and Rural Planning section of this calendar.

## XII. Graduate Class Descriptions

### Class Numbers

The first digit of an ARCH class number indicates whether it is a required MArch (First Professional) class (5), a graduate 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 Special Studies (4). Classes have various credit-hour extensions (01-16) that indicate the approximate class hours each week and are based on the appropriate balance of subjects for professional accreditation. Required classes may be interchanged between academic terms, depending on the availability of instructors. Not all elective classes (\*) may be offered every year. Please consult the academic timetable for current listings. Instructors are listed only for classes that may be available to students from outside the Faculty of Architecture.

### ARCH 5001.06: Design.

This class explores contemporary architectural questions through the design of a building of broad urban and cultural significance. Its emphasis on imagination and criticism characterizes self-motivated work in the graduate programme.

FORMAT: Lecture/studio

RESTRICTION: Graduate students in the Faculty of Architecture

PREREQUISITE: ARCH 4002.08 or equivalent

### ARCH 5101.04: History and Theory of Cities.

This class examines selected major cities, their originating form, important buildings, and building types in their history. The aim of the class is to explore the relationship between architecture and urbanism, and the relationship between individual buildings and the city.

FORMAT: Lecture/seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

### ARCH 5201.04: Building Systems Interface.

The objective of the class is to provide the student with a knowledge and understanding of the processes of building as they influence design through building systems: structure, construction, environmental technology and building services. Students learn to

evaluate different processes of building as a means of developing the design, and undertake a project relating technology to design, the technological content of which provides a basis for further study in subsequent class work.

FORMAT: Lecture/studio

RESTRICTION: Graduate students in the Faculty of Architecture

PREREQUISITE: ARCH 4202.04 or equivalent

### ARCH 5301.01: Professional Practice.

The class focuses on professional ethics, professional responsibility and practice management, including partnerships, corporate practices, legal aspects of practice, contracts, codes, reference documents, finance, costing techniques and contract administration.

FORMAT: Lecture/seminar

RESTRICTION: Graduate students in the Faculty of Architecture

### ARCH 5302.01/5303.01: Professional Practice (Co-op Work Term).

A student works in some aspect of the profession for a total of 1000 hours, to be accomplished in no less than 24 weeks, and completes a research report or assignment. Work placements are co-ordinated by the Co-op Co-ordinator for Architecture and must be approved by the School. A student may apply to satisfy up to 500 hours of the time requirement through supervised research related to Professional Practice.

NOTE: Students taking ARCH 5302.01 and 5303.01 must register in both in consecutive terms; credit will be given only if both are completed consecutively.

RESTRICTION: MArch (First Prof.) students

### ARCH 5304.01: Professional Practice.

Continuation of ARCH 5301.01.

FORMAT: Lecture/seminar

RESTRICTION: Graduate students in the Faculty of Architecture

PREREQUISITE: ARCH 5301.01

### \*ARCH 6101.02: Housing Research Seminar.

This seminar explores the interactions of the residential construction industry's constituent parts: real estate, finance, government policy and programmes, development interests, etc. An open-ended inquiry touches on such questions as housing quality, housing distribution patterns, employment, industrialization, urbanization, rural under-development, foreign ownership, and the role of the industry in the Canadian political-economy.

INSTRUCTOR: J.G. Wanzel

FORMAT: Lecture/seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

### \*ARCH 6102.02: Buildings in Perspective.

One or more buildings are examined as art, as part of a stylistic development, and as an expression of a particular historical period. Emphasis is also placed upon research methodologies in the history of architecture.

FORMAT: Lecture/seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

### \*ARCH 6103.02: Topics in Urban Design.

A theoretical overview of the practice of urban design, capable of informing students on the subject in their thesis preparation. Readings in the history and theory of urbanism, visual material and critiques of urban design projects are used to structure the class along a series of topics. Appropriate student work ranges from physical design to essay and from specific plan of action to theoretical exploration.

INSTRUCTOR: D. Procos

FORMAT: Lecture/seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

**\*ARCH 6105.02: Multimedia in Architecture.**

This class examines the use of various technologies in visualizing, developing, and displaying multimedia presentations of architectural designs. It also considers how architectural design work may be informed by an effective use of multimedia.

INSTRUCTOR: P. Kelly

FORMAT: Lecture/seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

EXCLUSION: ARCH 4205.02

**\*ARCH 6106.02: Interdisciplinary Studies for Architecture.**

This class examines affinities between architecture and other disciplines in the arts and/or humanities. It considers specific works and cross-disciplinary translations according to their technical means, theoretical premises and cultural intentions. Students are expected to have a working knowledge of architecture and at least one other discipline.

INSTRUCTOR: S. Parcell

FORMAT: Studio/seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

**\*ARCH 6107.02/6108.02/6109.02: Advanced Seminar in Humanities.**

This seminar class focuses on an advanced topic in the humanities. Specific topics may change from year to year.

FORMAT: Seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

**\*ARCH 6110.02/6111.02/6112.02: Advanced Seminar in Computer Applications.**

This seminar class focuses on an advanced topic in computer applications. Specific topics may change from year to year.

FORMAT: Seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

**\*ARCH 6113.02/6114.02/6115.02: Research Studies in Humanities.**

This class invites student involvement in a current research project by a faculty member.

FORMAT: Studio/seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

**\*ARCH 6116.02/6117.02/6118.02: Research Studies in Computer Applications.**

This class invites student involvement in a current research project by a faculty member.

FORMAT: Studio/seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

**\*ARCH 6201.02: Construction.**

This class reviews previously-studied subjects of building construction, with an introduction and consideration of recently introduced materials, to bring students up-to-date in their awareness of constructional options.

FORMAT: Studio/seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

**\*ARCH 6202.02: Innovations in Architecture and Building.**

This seminar explores influences which may lead to innovations in architectural design and building construction in response to emerging environmental issues and work/lifestyle. Means of study include research, design and making.

INSTRUCTOR: T. Emodi

FORMAT: Seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

**\*ARCH 6203.02/6204.02/6205.02: Advanced Seminar in Technology.**

This seminar class focuses on an advanced topic in technology. Specific topics may change from year to year.

FORMAT: Seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

**\*ARCH 6206.02/6207.02/6208.02: Research Studies in Technology.**

This class invites student involvement in a current research project by a faculty member.

FORMAT: Studio/seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

**\*ARCH 6301.02: Directed Studies in Professional Practice.**

This class is a directed study, guided by an architectural practitioner, in architectural research related to her or his practice. The research project may be proposed by the practitioner, or by the student in consultation with the practitioner. The project outline must be approved by the chair of the School's Professional Practice teaching group.

FORMAT: Seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

**\*ARCH 6302.02: Advanced Seminar in Professional Practice.**

This seminar class focuses on an advanced topic in professional practice. Specific topics may change from year to year.

FORMAT: Seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

**\*ARCH 6303.02: Research Studies in Professional Practice.**

This class invites student involvement in a current research project by a faculty member.

FORMAT: Studio/seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

**\*ARCH 6401.02/6402.02/6403.02: Personal Project.**

A Personal Project is a term-long, self-directed study proposed by a student and supervised by a faculty member. (Alternately, a qualified person outside the university may supervise the project if a faculty member agrees to act as an advisor.) Like a class outline, a Personal Project proposal must describe the academic objectives, the anticipated product, previous experience in this area, a general schedule, and criteria for evaluating the final work. The proposal must be approved by the supervisor/advisor and the School.

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

**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. The student presents the work at an oral examination, and the project document is prepared in accordance with university standards and submitted to the University.

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. The student presents the work at an oral examination, and the project document is prepared in accordance with university standards and submitted to the University.

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 9001X/Y.16: MArch (First Prof.) Thesis.**

Each student formulates a thesis question of personal and disciplinary importance, and pursues it through a design for a building. The work is supervised by a faculty member nominated by the student. The student is expected to become fluent in the history and theory of the topic and to devise an appropriate strategy for carrying out the work. The thesis concludes with a graphic/model presentation, an oral examination, and a formal thesis document that is submitted to the University. Detailed requirements are described in the MArch (First Prof.) thesis booklet. The thesis requires a minimum of two terms of residence and may extend to a maximum of five terms.

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.

RESTRICTION: MArch (First Prof.) 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 9004.00: Continuation - MArch (First Prof.) Thesis.**

Continuation of ARCH 9001.16.

RESTRICTION: MArch (First Prof.) 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.

## **Atmospheric Science**

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Location: Physics Department  
Sir James Dunn Building  
Halifax, NS B3H 1Z9  
- and -  
Oceanography Department  
Life Sciences Centre, Third Floor  
Halifax, NS B3H 4J1  
Website: [www.atm.dal.ca](http://www.atm.dal.ca)

### **Professors**

Chylek, P., Diploma (Charles, Prague), PhD (Calif)

### **Associate Professors**

Folkins, I., BSc (Dal), MSc, PhD (Toronto)

### **Assistant Professor**

Lohmann, U., MSc, PhD (Hamburg)

### **Adjunct Professors**

Barker, H., BSc (Toronto), MSc, PhD (McMaster), ARMP, MSc

Isaac, G., PhD (McGill), MSc

King, M., PhD (Az), NASA

Leitch, R., PhD (York), MSc

Li, Z., BSc, MSc (Nanjing), PhD (McGill), CCRS

## **I. Graduate Degrees**

Graduate degrees in Atmospheric Science may be taken through either the Physics or the Oceanography departments.

### **A. MSc Degree Programme**

Minimum class requirements are a total of five half-credit classes. Each student must take three core half-credit classes including PHYC 6570.03/OCEA 5570.03; PHYC 6580.03/OCEA 5580.03; and one of PHYC 5520.03/OCEA 5520.03, PHYC 5411.03/OCEA 5411.03, OCEA 5221.03, OCEA 5595.03. Classes may be taken through Physics or Oceanography.

Research and Thesis are required.

### **B. PhD Degree Programme**

Prospective graduate students should refer to the class requirements for the Departments of Physics or Oceanography. The classes required in the chosen department must include three core half classes described under the MSc programme.

If the student is registered in Oceanography, a student must take a comprehensive oral exam and he or she must write and defend a proposal for thesis research; if in Physics, a preliminary oral examination must be taken in the first year.

All candidates must prepare, research and orally defend a thesis.

# Biochemistry and Molecular Biology

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Location: Sir Charles Tupper Medical Building, 9th Floor  
Halifax, NS B3H 4H7  
Telephone: (902) 494-2480  
Fax: (902) 494-1355  
Website: <http://www.biochem.dal.ca>

## Head of Department

Palmer, F.B.St.C., BSc, PhD (UWO) Professor and Head

## Professors

Breckenridge, W.C., BSc (Queen's) MSc, PhD (Toronto)  
Dolphin, P.J., BSc, PhD, DSc (Southampton)  
Doolittle, W.F., AB (Harvard), PhD (Stanford)  
Gray, M.W., BSc, PhD (Alta)  
Lazier, C.B., BA (Toronto), MSc (UBC), PhD (Dal)  
Palmer, F.B.St.C., BSc, PhD (UWO)  
Singer, R.A., AB (Princeton), PhD (Harvard), Graduate  
Coordinator (Telephone: 494-2306)  
Wallace, C.J.A., BA, MA, DPhil (Oxon)

## Associate Professors

Byers, D.M., BSc, MSc (Dal), PhD (Alta), major appointment in  
Pediatrics  
Cook, H.W., BSc, MSc (McGill), PhD (Dal), major appointment in  
Pediatrics  
Dobson, M.J., BSc (Dal), DPhil (Oxon)  
Liu, P.X.-Q., BSc (Wuhan), PhD (Cornell)  
Ridgway, N.D., BSc, MSc (Dal), PhD (UBC), joint appointment with  
Pediatrics  
Ro, H.-S., BSc, PhD (McMaster)  
Too, C.K.L., BSc, MSc (Malaya), PhD (Hawaii)

## Assistant Professors

Bearne, S.L., BSc (Acadia), PhD (Toronto), MD (McGill)  
Hogue, D.L., BSc, PhD (Alta)  
McLeod, R.S., BSc, PhD (UBC)  
McMaster, C.R., BSc, PhD (Man), major appointment in Pediatrics  
Riddell, D.C., BSc, PhD (Queen's), major appointment in Pathology  
Roger, A.J., BSc (UBC), PhD (Dal)

## Adjunct Professor

Sensen, C.W., Dr.rer.nat. (Cologne), Associate Research Officer,  
National Research Council, Institute for Marine Biosciences  
Ewart, K., Vanya, PhD (MUN), Associate Research Officer,  
National Council, Institute for Marine Biosciences

## 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 TOEFL score of at least 600 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 Biochemistry and also those with training in related fields such as biology, chemistry and related biomedical sciences. Our programme is designed to ensure that all graduate students acquire a general background in biochemistry and molecular biology that will

provide a solid foundation for career development. In addition, each student specializes in one of the following areas: gene expression and cell regulation; lipids, lipoproteins and membranes; molecular evolution; proteins. Advanced knowledge within a specialty 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.

Entering graduate students are assessed with regard to their general background in biochemistry, in an open-book written fashion, to ensure that they have a grasp of the important principles in solving biochemical problems and have the background necessary for advanced classes. A preliminary examination related to the subject area of the thesis occurs at the end of the first year of study. Application may be made at that time for transfer from an MSc to a PhD programme. Scholarship support is available, and students are eligible for the Patrick Prize, awarded by the Department to recognize excellence in graduate research. Additional information can be obtained by contacting the Department for a copy of our booklet, *Research and Graduate Study in Biochemistry and Molecular Biology*.

## III. Degree Programmes

### A. Master of Science (MSc) in Biochemistry

A thesis describing original research done by the candidate is prepared and defended orally. A Thesis Supervisory Committee consisting of the research director and two others is appointed to assist the candidate.

The minimum residence requirements for the two MSc programmes (see the Faculty of Graduate Studies regulations) are 1 and 2 years, respectively. Experience has shown that most candidates require an additional 6-12 months to complete the thesis.

### B. Doctor of Philosophy (PhD) in Biochemistry

The preparation and oral defence 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 director and three others is appointed to oversee the research. The minimum residence requirements of the PhD are 2 years from the MSc and 3 years from the BSc (see the Faculty of Graduate Studies regulations). Most students require an additional 1-2 years to complete the thesis.

### C. Master of Science (MSc) in Biochemistry/Neuroscience

The department also participates in the interdisciplinary Neuroscience MSc programme.

### D. Doctor of Philosophy in Biochemistry/Neuroscience (PhD)

The department also participates in the interdisciplinary Neuroscience PhD programme.

### E. Doctor of Philosophy with Doctor of Medicine (Combined MD/PhD)

For information on the combined MD/PhD programme see "Combined MD/PhD Programmes" in the Faculty of Graduate Studies section, page 31.

## IV. Areas of Specialization

### A. Gene Expression and Cell Regulation

Dobson, M.J. - Chromosome Structure and Function: yeast plasmid segregation, mammalian molecular genetics.  
Hogue, D.L. - Structure and Function of Membrane Proteins: solute transporters in lysosomes and mitochondria: molecular and cellular biology, pharmacological and physiological roles.  
Lazier, C.B. - Androgen Action: androgen regulation and gene expression in the prostate.  
Riddell, D.C. - Human Molecular Genetics: tumor suppressor genes. Gene mapping.

- Ro, H.-S. - Signal transduction pathway in adipogenesis, mammatogenesis and spermatogenesis: gene expression, heterotrimeric G protein, MAP kinase, obesity, breast cancer, infertility, transgenic and knockout mice.
- Singer, R.A. - Cell Growth Control: eukaryotic (yeast) gene expression and membrane dynamics (with G.C. Johnston, Microbiology and Immunology).
- Too, C.K.L. - Prolactin Action: signal transduction, gene expression and regulation of lymphoid tumor cell growth and apoptosis.

## B. Lipids, Lipoproteins and Membranes

- Breckenridge, W.C. - Lipoproteins and Atherosclerosis: structure and function of lipids and apolipoproteins in relation to lipoprotein metabolism.
- Byers, D.M. - Membrane Proteins and Lipids: protein kinase C substrates and membrane signalling; structure and function of acyl carrier protein.
- Cook, H.W. - Membrane Lipid Metabolism and Signal Transduction: lipid second messengers, protein kinase C isoforms and lipid turnover in neural cells; plasmalogens and peroxisomal disorders.
- Dolphin, P.J. - Lipoprotein Metabolism: molecular enzymology of lipolytic enzymes; genetic defects in man and animal models; reverse cholesterol transport.
- McLeod, R.S. - Lipoprotein Assembly: structure and function of apolipoproteins; regulation of hepatic apoB secretion; hepatocyte lipid mobilization.
- McMaster, C.R. - Phospholipids: regulations of vesicle mediated intracellular trafficking; molecular and genetic analyses of lipid metabolism.
- Ridgway, N.D. - Sphingomyelin and Cholesterol: metabolic and coordinate regulation.

## C. Molecular Evolution

- 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. - Structure, Function and Evolution of Mitochondrial Genomes and Ribosomal RNA: plants and protists; transcription, RNA processing and RNA editing.
- Liu, P.X.-Q. - Gene Structure and Function: intein and protein splicing; plastid genome evolution.
- Roger, A.J. - Eukaryotic Organelle, Gene and Genome Evolution: origin of mitochondria, protistan phylogeny and genome evolution, hydrogensome evolution, models of protein evolution, phylogenetic methods, evolution of gene families.
- Sensen, C.W. - Genome Sequencing and Analysis of Genomic Sequence.

## D. Proteins

- Bearne, S.L. - Enzyme Catalysis: transition state analogues; enzyme inhibition; bio-organic reaction mechanisms; biochemical recognition; protein modifications.
- Ewart, K.V. - Fish Biochemistry and Physiology: protein structure and function, gene expression, innate immunity, freeze avoidance.
- 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. Classes Offered

### Graduate Classes in Biochemistry

Classes marked (\*) are not 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 research topics.

#### 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 research topics.

#### BIOC 5010.03: Bioinformatics.

This class presents the algorithms developed for, and applications of, various fields of computing in biochemistry and molecular biology. A broad array of disciplines will be examined including sequence-based structure prediction and metabolic modelling, but with an emphasis on database searches, phylogenetics and molecular modelling. The content of the class may vary according to the availability of expertise. Class will include occasional computer-based workshops in molecular modelling, phylogenetics and metabolic modelling.

#### BIOC 5300.03: Biochemical Communication: Membranes and Cell Signalling.

This class examines the biochemical mechanisms underlying signal transduction of neurotransmitters, hormones and growth factors. Topics include membrane biogenesis and vesicle trafficking, first messenger synthesis, structure and regulation of receptors, G-proteins, lipid second messengers and calcium, protein kinases/phosphatases, and regulation of gene expression. Emphasis is on modern biochemical approaches to the elucidation of transmembrane signalling components and pathways. Evaluation is based on a mid-term examination, an essay and oral presentation on an advanced topic, and a final examination.

CO-ORDINATOR: D.M. Byers

INSTRUCTORS: C.B. Lazier, C.R. McMaster and H.-S. Ro

FORMAT: Lecture 3 hours

PREREQUISITES: BIOC 3200, 3300, and 3400 or equivalent, or special permission.

#### 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.

INSTRUCTORS: H.W. Cook and N.D. Ridgway

FORMAT: Lecture 3 hours per week

PREREQUISITE: An introductory class in biochemistry

#### \*BIOC 5302.03: Structure, Biosynthesis and Metabolism of Lipoproteins.

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 genesis 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 a mid-term essay and a final examination.

INSTRUCTORS: P.J. Dolphin and R.S. McLeod

FORMAT: Lecture 2 hours

PREREQUISITE: A comprehensive introductory class in biochemistry.

#### \*BIOC 5401.03B : The World of RNA.

This class examines many of the interesting biochemical reactions in which RNA directly participates. Topics may include catalytic RNA; self-splicing introns and maturases; processing of eukaryotic mRNA (cis- and trans-splicing); processing of eukaryotic rRNA; and RNA editing. The evolution of these processes will also be explored. Topics chosen in any year will be guided by the interests of those taking the

class. Evaluation is normally based on student participation (including one or more oral presentations) and a final review-type paper on an assigned topic.

INSTRUCTOR: M.W. Gray

FORMAT: Lecture/seminar, guided reading and discussion 2 hours

PREREQUISITES: BIOC 4403 and 4404, taken previously or concurrently, or equivalent preparation

### **\*BIOC 5402.03: Biochemical Evolution.**

Students will produce a substantial literature review in an area of molecular (gene and protein) evolution, to be decided on with the instructors. In the past, topics have included "selfish DNA", "directed" mutagenesis and the origins of introns.

CO-ORDINATOR: W.F. Doolittle

FORMAT: Seminar/discussions and guided reading

### **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, behaviour 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 Human Genome Project will be discussed at some length.

Evaluation is based on a mid-term examination and paper, an oral presentation and a final examination.

INSTRUCTORS: P. Liu and W.F. Doolittle

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: R.A. Singer

FORMAT: Lecture 3 hours

PREREQUISITES: Introductory molecular biology equivalent to BIOC 2030, BIOC 3400 and MICI 3033, or permission of the instructor

### **BIOC 5603.03: Advanced Laboratory in Biochemistry and Molecular Biology Techniques.**

This class will consist of a series of laboratory modules (each of 4 weeks duration, 6 hours per week) organized collaboratively by the departments of Biochemistry and Molecular Biology, 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. 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 programme. 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 and Molecular Biology 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.

COORDINATOR: H.-S. Ro

FORMAT: Laboratory approximately 72 hours total

### **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. Most weeks, in addition to lectures, students will independently research and write about specialized topics suggested by the instructor and occasionally present these to the class in discussion group format.

INSTRUCTOR: 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.L. Bearne

FORMAT: Lecture 2.5 hours, seminar/tutorial 0.5 hours

PREREQUISITE: 3000-level classes in Biochemistry, CHEM 3403, CHEM 2301, and CHEM 2302, or instructor's consent

### **BIOC 5811.03: Biochemistry of Clinical Disorders.**

This class is an introduction to the pathophysiology of disease. It provides the clinical 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.

COORDINATOR: L.C. Dymond

FORMAT: Lecture 3 hours, case studies and assignments

CROSS-LISTING: PATH 5011.03

### **BIOC 5812.03: Biochemistry of Clinical Disorders.**

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.

COORDINATOR: L.C. Dymond

FORMAT: Lecture 3 hours, case studies and assignments

CROSS-LISTING: PATH 5012.03

### **BIOC 5910.06-5913.06: Biochemistry and Molecular Biology Seminar.**

This class presents the algorithms developed for, and applications of, various fields of computing in biochemistry and molecular biology. A broad array of disciplines will be examined including sequence-based structure prediction and metabolic modelling, but with an emphasis on database searches, phylogenetics and molecular modelling. The content of the class may vary according to the availability of expertise. Class will include occasional computer-based workshops in molecular modelling, phylogenetics and metabolic modelling.

COORDINATOR: A.J. Roger

FORMAT: Lecture 3 hours

PREREQUISITES: BIOC 3200.03, 3300.03 and 3400.03 or instructor's consent

### **BIOC 9000.06: MSc Thesis.**

### **BIOC 9530.06: PhD Thesis.**

# Bioethics

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Location: Clinical Research Centre  
5849 University Avenue  
HALIFAX, NS B3H 4H7  
Telephone: (902) 494-3801  
Fax: (902) 494-3865  
Website: medicine.dal.ca/bioethics

## Department Head

Kenny, N.

## Professor

Kenny, N.

## Associate Professor

Baylis, F.

## Assistant Professor

Weijer, C.

## Lecturer

Ells, C.

## 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.

This 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. Specific topics will be identified each year.

INSTRUCTORS: F. Baylis, N. Kenny, C. Weijer

FORMAT: Seminar 3 hours

PRE-REQUISITE: Permission of the instructor

### 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.

INSTRUCTORS: F. Baylis, C. Weijer

FORMAT: Seminar 3 hours

PRE-REQUISITE: Permission of the instructor

# Biological Engineering

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Location: "N" building  
Telephone: 902-494-3275  
Fax: 902-423-2423  
E-mail: Bio.Engineering@dal.ca

## Department Head

Ben-Abdallah, N., BSc, MAsC, PhD, PEng, PAg. Thermal energy storage, desiccant dehumidification, HVAC/ indoor air quality, solar energy

## Professors

Burney, J.R., BScEng, MScEng, PhD, PEng. Watershed modeling, hydrology, soil and water conservation, environmental engineering.

Ghaly, A.E., BScEng, MScEng, PhD, PEng. Energy, waste management, environmental engineering, post harvest technology, biotechnology, bioremediation.

Watts, K.C., BSA, MSc, PhD, PEng. Biodiesel fuel, aquacultural engineering, agricultural machinery design, blood flow modeling.

## Associate Professors

Correia, L.R., BTech(Hons), MS, PhD, PEng. Heat and mass transfer in foods, food engineering, biosensors.

Wilkie, K.I., BEng, MEng, PhD, PEng. Bio-robotics, instrumentation.

The following local researchers are also eligible to supervise graduate students in the Biological Engineering Department.

## Adjunct Professors

Adsett, J.F., BSc, MScEng, PhD, Nova Scotia Agricultural College. Continuous nitrate monitoring, aquifer heat storage.

Edwards, L.M., BSc, MSc, PhD, PAg, Agriculture Canada Research Station, Charlottetown. Soil erosion under conditions of freezing and thawing.

Hellenbrand, K., PhD. Plant fungus relationships (micorrhizae), microbial air pollution, biofilms in terrestrial and ocean environments

Madani, S.D., BSc, MSc, PhD, Agricultural Engineering, Nova Scotia Agricultural College. Water quality, watertable management, subsurface drainage systems, irrigation scheduling.

Sami, S., BScEng, MScA, PhD, University of Moncton. Alternative refrigerants, heat pumps, absorption.

Stratton, G., BSc, MSc, PhD, Biology, Nova Scotia Agricultural College. Bioremediation, environmental microbiology, waste management.

## Adjunct Associate Professors

Mann, H., PhD, Biology, St Mary's University. Biomineralization, biodegradation, biotransformation, biofouling

## 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.

Specifically, the Department 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 Engineering, Science and Agriculture and with 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 programmes.

## II. Classes Offered

### **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  
**CROSS-LISTING:** BIOE 4000.03

### **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.  
**CROSS-LISTING:** BIOE 4010.03

### **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.  
**PREREQUISITE:** BIOE 4612.03 or equivalent

### **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.  
**PREREQUISITES:** BIOE 3400.03 or equivalent

### **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.  
**PREREQUISITES:** BIOE 3432.03 or equivalent

### **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 placed on recent research in these areas. The principles of process design will be incorporated in the design of various food processing plants.  
**Prerequisites:** Approval of instructor.

### **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.  
**PREREQUISITE:** BIOE 4651.03 or equivalent

### **BIOE 6700.03: Directed Studies I.**

This class is available to graduate students enrolled in a MASc or MEng degree programme 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 Ph.D. 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 programme 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.**

## **Biology**

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Location: Life Sciences Centre  
1355 Oxford Street  
Halifax, NS B3H 4J1  
Telephone: (902) 494-3515  
Fax: (902) 494-3736

### **Chair**

Freedman, B.,

### **Professors Emeriti**

McLaren, I.A., MSc (McGill), PhD (Yale). 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**

Brown, R.G., MSc (McGill), PhD (Rutgers). George S. Campbell Professor. Immuncontraception of seals, contraceptive vaccine, harp and grey seals, fertility control of finfish.  
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, site quality, biodiversity, conservation, environmental education.  
Hall, B.K., PhD, DSc (UNE), FRSC, Killam Professor of Biology. Vertebrate skeleton, mammalian embryos, neural crest-derived craniofacial skeleton, developmental biology, evolution, fish embryos, bird embryos, development and evolution, cell differentiation, morphogenesis.  
Kimmins, W.C., PhD (London). Wildlife management, parasitology, reproductive physiology, immunology.  
Lane, P.A., MSc (SUNY Binghamton), 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.  
MacRae, T.H., MSc, PhD (Windsor). Cell/molecular biology, tubulin gene expression, gamma-tubulin, centrosome, microtubule organization, cytoskeleton, small heat shock/a-crystallin protein, molecular chaperone, embryo development.  
Meinertzhagen, I.A., PhD, DSc (St Andrews), Killam Professor in Neuroscience, major appointment in Psychology. Visual system in flies, *Drosophila*, synapse formation, computer 3-D construction techniques, circadian rhythms, cell lineage, neurons in ascidian tadpole larva, evolution of all of these.  
Mills, E.L., MS, PhD (Yale), major appointment in Oceanography, Killam Professor of Ocean Studies. History of Science, marine biology, biological oceanography, social and scientific factors.  
Myers, R.A., BSc (Rice), MSc, PhD (Dal). Killam Research Professor. Population ecology; fisheries science; fisheries management; conservation biology; evolution of life histories; meta analysis; statistical ecology.  
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.

Pohajdak, B., MSc, PhD (Man). Molecular immunology, (NK) cells, tumors, cloning techniques, immunosuppression vaccines, transgenic fish, hume 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. Polydnarivuses; parasitism in insects; honeybee viruses. .

Walde, S.J., PhD (Calgary), NSERC Research Fellow. Predator-prey interactions, terrestrial arthropod populations, metapopulation dynamics, dispersal, competition.

Wassersug, R.J., PhD (Chic), major appointment in Anatomy and Neurobiology. Functional morphology; amphibian larvae; vertebrate adaptations; development; evolution.

Willison, J.H.M., PhD (Nottingham). Biodiversity conservation, biodiversity monitoring protocols, urban ecology, marine protected areas, protected areas systems.

Whitehead, H., MA, PhD (Cambridge). Behaviour, ecology, population biology of whales, social structure in vertebrates.

Wright, J.M., PhD (Memorial). Gene expression, eukaryotic genomes, DNA fingerprinting, fish, DNA markers, genetics.

### Associate Professors

Hutchings, J., MSc, PhD (Memorial). Ecology of fishes, life history evolution, salmonid fish, population biology, commercially exploited fishes, reproductive strategies, evolutionary ecology.

Johnston, M.O., PhD (Chic). Evolutionary genetics, plant evolution, plant ecology, plant reproduction, evolution of self-fertilization, inbreeding depression, speciation, floral development, sex allocation in hermaphroditic animals.

Iverson, S.J., PhD (Maryland), WFA. Reproductive strategies in mammals, lactation and energetics lipid metabolism, fatty acids, diets in marine mammals.

Leonard, M.L., PhD (Ottawa). Behavioral ecology, parent-offspring interactions, conflict, sibling competition, avian communication and energetics.

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.

Rajora, O.P., PhD (Toronto). Forest genetics and biotechnology, molecular, population, conservation and evolutionary genetics, genome and QTL mapping; molecular breeding; molecular genetics and mapping of disease resistance and adaptive traits; EST sequencing and gene discovery; genetic effects of resource management practices and natural disturbance, and conservation, sustainable management and restoration of genetic resources, phytoremediation, molecular systematics, examine microbial influenced corrosion, extreme environments, and bioremediation.

### Associate Professor (Research)

Armstrong, S.L., MSc (Mt. A), PhD (Memorial), JWEL. Microbial ecology and environmental microbiology with emphasis on product development and mitigation of environmental problems.

Newkirk, G.F., PhD (Duke). International Development, production systems for coastal waters, community based coastal resources management, development of aquaculture options.

### Assistant Professors

Hart, M., BSc (Alberta), MSc (Dal), PhD (Washington). Larval biology, life history evolution, phylogenetics, and population genetics of marine invertebrates.

Herbinger, C.M., PhD (Dal). Forest genetics and biotechnology, tree breeding population and quantitative genetics, evolution, marine biology, 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.

Lloyd, V., BSc, MSc (Geneva), PhD (BC). Molecular and classical genetics of *Drosophila* models for human diseases, gene cloning, genetic and developmental analysis.

### Adjunct Professors

Asiedu, S., BSc, MSc, PhD (McGill), HRA

Boutilier, R., MSc (Acadia), PhD (East Anglia)

Bowen, W.D., PhD (UBC), BIO

Caldwell, C.D., PhD (East Anglia), NS Agric Col.

Campana, S.E., PhD (UBC), BIO

Castell, J.D., MSc (Dal), PhD (Oregon)

Chapman, A., PhD (Liverpool)

Cone, D.K., MSc (Guelph), PhD (UNB), St. Mary's University

Craigie, J.S., MSc, PhD (Queens), Inst. Marine Bioscience, NRC

Douglas, S.E., MSc, PhD (Dal)

Doull, J., PhD (Dal) MSVU

Doyle, R., MSc (Dal), PhD (Yale)

Harrington, F., PhD (State U. of N.Y.), MSVU

Harrison, W.G., PhD (New York at Stony Brook)

Hatcher, B., MSc (Dal), PhD (Sydney), Dal

Head, E., MPhil (London), PhD (Wales), BIO

Johnson, S., BSc, MSc (Dal), PhD (Simon Fraser)

Ju, H.Y., PhD (McGill), NSAC

Karma, O., MSc (NC State), PhD (Wash)

Kenchington MSc (Dal), PhD (Tasmania), Fisheries and Oceans

Kepkay, P.E. MSc, PhD (Dal), BIO

Kerr, S.R., MSc (Queen's), PhD (Cal), BIO

Lall, S.P., MSc, PhD (Guelph), NRC

Mann, H., MSc, PhD (UWO), SMU

Mann, K.H., PhD (Reading), DSc (London), FRSC, BIO

McLachlan, J.L., MA, PhD (Oregon State College), Acadia University

Olivier, Gilles, BSc, MSc, PhD (Montreal)

Nowak, J., PhD (Olsztyn), PhD (Dal), NSAC

Platt, T.C., MA (Toronto), PhD (Dal), BIO

Ross, N., BSc, PhD (McGill)

Ruzzante, D.E., PhD (Dal)

Silver, M., PhD (Syracuse)

Tennessee, T., PhD (Alta), NSAC

Van der Meer, J.P., PhD (Cornell), NRC

Vasseur, L., MSc (Quebec), PhD (Queen's), SMU

Vezina, A., BSc (Laval), PhD (McGill)

Warman, P.R., MSc, PhD (Guelph), NSAC

Zouros, E., MSc, PhD (Agr Col Athens), PhD (Chicago)

## 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 programme should be addressed to Dr. Finn Sander, Biology Department.

## II. Degree Options

### A. MSc Degree Programme

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. The thesis may count as 1, 2, or 3 credits. 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 Programme

BIOL 5700.03 (or 5701.03) and BIOL 5706.03 are required classes and additional classes may be specified by supervisory committees.

A preliminary examination on subjects in the general area of the thesis research is required for all PhD students. Students must pass the preliminary examination at least one year before submitting a PhD thesis.

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 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, Faculty Advisor 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 programme. No credits are received for these. A maximum of one audit class is allowed for each year of the specified programme (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 programme 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: Population Biology  
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 programme be prepared for each student by October 15th in their first year.

## IV. Required Classes

### 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).

INSTRUCTOR: H. Whitehead

FORMAT: Two hours/week 1:30 p.m. - 3:30 p.m. Fridays

NOTE: Required of all MSc and PhD students. PhD students who have already completed BIOL 5700C (and others by special arrangements) may take BIOL 5701C.

This class will be given mostly in the Fall term and is graded pass/fail.

### 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: H. Whitehead

### BIOL 5705.03/5706.03: Graduate Module Classes

All new graduate students must complete a module class (out of about 15-20). All students choose from the same set of modules. Three modules are required for each half credit. Students who have taken BIOL 5705.03 may take BIOL 5706.03. Both classes are graded. Several modules may also be offered at the Nova Scotia Agricultural College (NSAC) in Truro. Their titles will also be listed on the module bulletin board. A student wishing further information about these modules should contact Dr. Claude Caldwell at NSAC (1-902-893-6680).

## V. Summary of Class Offerings

Related to Steam A

BIOL 5060.03	Environmental Ecology
BIOL 5061.03	Experimental Design and Data Analysis in Biology
BIOL 5616.03	Ecosystem Analysis
BIOL 5651.03	Marine Mammalogy
BIOL 5214.03	Physiology and Biochemistry of Marine Algae

Related to Stream C

BIOL 5012.03	Advanced Laboratory in Biochemical Techniques
BIOL 5030.03	Topics in Genetics
BIOL 5101.03	Industrial Microbiology and Biochemistry

Related to Steam D

BIOL 5070.03	Advanced Topics in Animal Physiology
BIOL 5074.03	Introduction to Animal Nutrition
BIOL 5075.03	Nutrition in Aquaculture
BIOL 5103.03	Infectious Diseases of Aquatic Organisms

The following Biology graduate classes are suitable for students at the Nova Scotia Agricultural College:

BIOL 5060.03	Environmental Ecology
BIOL 5101.03	Industrial Microbiology and Biochemistry
BIOL 5070.03	Advanced Topics in Animal Physiology
BIOL 5074.03	Introduction to Animal Nutrition
BIOL 5075.03	Nutrition in Aquaculture

The following graduate classes are normally given at the Nova Scotia Agricultural College. Phone Dr. C. Caldwell (1-902-893-6680) for more information.

### Regular Classes

AG527:	Economic Entomology
AG535:	Animal Research Methods
AG536:	Protein Nutrition
AG538:	Quantitative Genetics
AG539:	Molecular Genetic Analysis of Populations
AG552:	Plant Breeding Methods
AG553:	Nitrogen in Crop Production
AG556:	Advanced Crop Physiology
AG570:	Communication Skills & Graduate Seminar
AG571:	Module Class
AG572:	Applied Statistics & Experimental Design for Agriculture
AG573:	Module Class II
AG900:	Graduate Thesis

### Special Topic Classes

AG521:	Special Topics in Environmental Microbiology
AG522:	Special Topics in Weed Science
AG524:	Special Topics in Environmental Impact
AG526:	Special Topics in Plant Pathology
AG531:	Special Topics in Applied Ethology
AG534:	Special Topics in Animal Physiology
AG537:	Special Topics in Animal Breeding and Genetics
AG541:	Special Topics in Soil Fertility

- AG543: Special Topics in Environmental Analysis  
 AG546: Special Topics in Soil and Water Management  
 AG547: Special Topics in Analytical Instrumentation for Researchers  
 AG551: Special Topics in Plant Breeding  
 AG554: Special Topics in Crop Physiology  
 AG557: Special Topics in Agricultural Biotechnology  
 AG561: Special Topics in Animal Product Technology

#### Cross-Referenced Classes

Cross references with undergraduate classes are shown in brackets ( ).

- AG525: Soil Microbiology (B400)  
 AG544: Organic Environmental Analysis (CS420)  
 AG545: Environmental Soil Chemistry (CS440)  
 AG558: Plant Biotechnology (PS475)  
 AG559: Biotechnology in Agriculture - Opportunities, Issues and Choices (IN475)  
 AG562: Ruminant Digestive Physiology & Metabolism (AS475)

## 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 programme. 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.

INSTRUCTORS: J. Ro and J.M. Wright

COORDINATOR: H.-S. Ro

FORMAT: Laboratory, approximately 72 hours total

CROSS-LISTING: BIOC 4603.03/5603.03, BIOL 4012.03, MICI 4601.03/5601.03

### BIOL 5030.03: Topics in Genetics.

This class involves independent study and is intended for graduate students who wish to investigate, under the direction of a professor, an area of biology not covered in other classes. Students should first consult with a faculty member to arrange the topic of study. An outline of the class content and method(s) of evaluation must be submitted to R.W. Lee who is the only person who should sign the approval form.

INSTRUCTOR: R.W. Lee

FORMAT: Essay and seminar

### 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: R.G. Latta

FORMAT: Lecture/seminar

PRE-REQUISITE: 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: B. Freedman

FORMAT: Lecture/tutorial, 3 hours

PREREQUISITE: None

CROSS-LISTING: BIOL 3060.03

### BIOL 5061.03: Experimental Design and Data Analysis 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.

INSTRUCTORS: R. Scheibling

FORMAT: Lecture, 3 hours

CROSS-LISTING: BIOL 4061.03

### 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 based on one of their presentations.

INSTRUCTORS: 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.

PRE-REQUISITE: Permission of instructor

### BIOL 5075.03: Nutrition in Aquaculture.

The focus will be on the application of nutrition to fish, crustacean and molluscan culture. Topics will include lipids and essential fatty acids, macro and trace elements, vitamins, proteins and carbohydrates. Class requirements will include a mid-term, student seminar, research paper and final exam.

### 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: 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 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: A. Cembella and J.S. Craigie

FORMAT: Lecture, 2 hours

**BIOL 5616.03: Ecosystem Analysis.**

This class involves critical discussions of recent developments in the theory and practice of ecosystem analysis. The research literature is the text. The term is divided into four sections: 1) general systems theory, 2) quantitative ecosystem description methodologies - multivariate statistics, niche theory, 3) systems analysis-computer simulation; and 4) qualitative techniques - loop analysis, food webs and time averaging. Each student is required to lead some discussions and to submit a term paper demonstrating a creative application of these methodologies to an environmental problem at the ecosystem level. Students complete problem sets and exercises in data analysis and to conceptual applications to gain experience using the various techniques. Aquatic ecosystems are emphasized.

INSTRUCTOR: P. Lane

FORMAT: Lecture/discussion, 3 hours

CROSS-LISTING: BIOL 4616.03

**BIOL 5651.03: Marine Mammalogy.**

The class will examine the characteristics that mammals brought with them when they returned to the ocean, the evolution of the different groups of marine mammals, some of their special adaptations, the roles of marine mammals in oceanic ecosystems and general principles of the marine mammal population in biology. Students will use information on the biology of marine mammals to explore conservation/management issues.

INSTRUCTOR: H. Whitehead

FORMAT: Lecture/projects, 3 hours

CROSS-LISTING: BIOL 4060.03

PREREQUISITE: Permission of instructor required

**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 a 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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Location: Room 5194  
Dentistry Building  
5981 University Avenue  
Halifax, NS B3H 3J5  
Telephone: 902-494-3427  
Fax: 902-494-2527  
E-mail: BME@Dal.ca  
Website: <http://www.dal.ca/bme>

## Director

Lee, J.M., (Interim Director)

## Graduate Coordinator

Stroink, G.

## Professors

- 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.
- 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 magnetocardiography. 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.
- 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.
- McGrath, P., PhD (Queen's). Analysis of EEG data on pain. Pain in the developing organism from a clinical perspective. Primary appointment in Psychology.
- Stroink, G., PEng., PhD (McGill). Clinical applications of magneto-cardiographic and body surface potential mapping and analysis; biomagnetic imaging, analysis of electro-encephalographic maps. Primary appointment in Physics.
- Wright, J.R., Jr., MD (Ohio State), PhD (Ohio State Graduate School). Pancreatic islet transplantation, and cell encapsulation. Primary appointment in Pathology.

## Associate Professor

Hung, O., MD (Dal). Pharmacokinetics, pharmacodynamics, drug delivery system, liposome-encapsulation, opioid and local anaesthetics. Primary appointment in Anaesthesiology.

## Assistant Professors

Anderson, G., PhD (Toronto), BVSc (Melbourne), Dipomate ACVS (American College of Veterinary Surgeons). Investigation of mechanotransduction mechanisms in bone from normal and osteoporotic animals as well as the role of biomaterial particles

- in causing the loosening of total joint replacements. Primary appointment in Surgery.
- Deluzio, K., PhD (Queen's). Gait assessment in osteoarthritis and prosthetic joint replacement, joint kinematics and wear simulation, signal analysis. Primary appointment in School of Biomedical 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.
- 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.
- Kember, G., PhD (Western). Signal processing, including pattern recognition and data compression. Modelling of neural control, particularly stochastic resonance. Primary appointment in Engineering Mathematics.
- 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.
- 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.
- Ruan, S., PhD (Alberta). Differential equations and dynamical systems, population dynamics, neural network models, epidemiological models. Primary appointment in Mathematics & Statistics.

## Adjunct Professors

The following researchers are also eligible to supervise graduate students in the School of Biomedical Engineering:

- Biden, E., PhD (Oxford). Human movement and upper limb prosthetics. Primary appointments in Mechanical Engineering and the Institute of Biomedical Engineering at the University of New Brunswick.
- DeMont, E., PhD (UBC). Structure and function of natural biomaterials, muscle function in locomotion. Primary appointment in Biology, St. Francis Xavier University.
- 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.
- Ramirez, M., MAsc (Toronto). Director, Biomedical Engineering, IWK Grace Health Centre. Medical information management, patient monitoring devices, use of lasers in medicine, and medical instrumentation.
- 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 (ii) Bioelectricity/Biomagnetism and Imaging, and (iii) Rehabilitation Engineering. Other significant research efforts in biomedical engineering at Dalhousie include work in kinesiology and gait, instrumentation, medical informatics, and physiological modelling.

The programme offers a Master of Applied Science (MAsc) degree in Biomedical Engineering.

## II. Admission

Candidates must satisfy the general requirements for admission to the Faculty of Graduate Studies.

Students will be accepted into the MASc programme from:

1. a BEng or BAsC from an accredited undergraduate engineering programme
2. a 4-year BSc in the physical sciences (e.g. Mathematics, Physics, Chemistry, etc.) with research experience\*\*
3. a 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 programme. 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.

### Financial Support

Stipends of \$14,000 to \$17,000 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, preferably by April 1 at the latest.

## III. Degree Requirements

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 programme.
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 into the School of BME, a co-supervisor from within the school will be named on the advice by 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.

Each student will have a supervisory committee consisting of at least the Graduate Coordinator and one other faculty member of the school (in addition to the supervisor). 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.

## IV. Classes Offered

### BMNG 5010.03: Introductory Physiology for Biomedical Engineering.

The function of organs and body systems is presented through lectures and seminars. Special emphasis is on integration of function in the whole organism. 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.

### BMNG 5020.03: Cell Biology for Biomedical Engineering.

This class offers an introduction to the eukaryotic cell structure and function for engineering and physical science students who do not have a strong biological background. The class will emphasize elements of cellular function which have particular relevance to the Biomedical Engineering research: e.g. biomechanics, electrophysiology, biocompatibility of materials, and tissue engineering. Topics will include: cellular structure, organelles and cytoskeleton at the ultrastructural and molecular level, models of cytoskeletal function, protein production and processing, construction of extracellular matrix components, cell connections with extracellular matrix and cell-cell connections and signaling, mechanotransduction, introduction to cell division, tissue growth and development. The concept of the cell as a structural and functional unit within its extracellular matrix will be emphasized. Concepts relevant to tissue engineering will be introduced.

### 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 adaptation, (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.

### 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.  
INSTRUCTOR: K. Deluzio

### **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.  
INSTRUCTOR: P. Gratzner

### **BMNG 5210.03: Instrument 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, flow, temperature, and sound). Issues such as sampling, aliasing, filtration, convolution, and image analysis will be examined.  
INSTRUCTOR: G. Maksym

### **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 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 5410/20/30.03: 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 programme.

### **BMNG 9000.00: MASC Thesis.**

# Business Administration

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Location: MBA Programme  
Mezzanine Gallery  
School of Business Administration  
6152 Coburg Road  
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 programme leading to the degree of Master of Business Administration.

## Advisory Board

Our Board includes a diverse group of Canada's most highly respected senior executives. They provide insight and guidance for our programs and policies. This essential link with the business community ensures that the Dalhousie School of Business remains responsive to ever-changing business trends, market conditions and employer requirements.

## Chair

Petley-Jones, A., President, APJ Management

## Members

Berggren, B., Chairman, Stora Kopparbergs Bergslags AB, Stockholm

Black, B., President, The Maritime Life Assurance Company, Halifax

Brooks, M., Director, Centre for International Business Studies, Dalhousie University, Halifax

Chen, C.J., Sr. Partner Rajah & Tann, Singapore

Day, G., Chancellor, Dalhousie University, Halifax

Doane, L., FCA, Partner, Grant Thornton, Halifax

Duvar, I.H., Chairman, Maritime Tel & Tel Limited, Halifax

Fountain, F., Great Eastern Corporation Limited, Halifax

Hennigar, D., Chairman, Annapolis Basin Group, Bedford

Jacques, H., President & CEO, Jacques Whitford, Dartmouth

Jalilvand, A., Dean, Faculty of Management, Dalhousie University, Halifax

Klapstein, R., Director, School of Business Administration, Dalhousie University, Halifax

Mackay, D., President, Aberach Securities, Toronto

Mann, D., President & CEO, Nova Scotia Power Inc., Halifax

Mathers, H.I., President, I.H. Mathers & Son Ltd., Halifax

Nicholson, P.J., Senior VP, Corporate Strategy, BCE Inc., Montreal

Oland, D., President, Moosehead Breweries Ltd., Saint John

Parker, S., President, Corporate Communications Ltd., Halifax

Risley, J., President, Clearwater Fine Foods Inc., Bedford

Rowe, K.C., President, IMP Group Ltd., Halifax

Walsh, E., Director, Co-operative Education, School of Business Administration, Dalhousie University, Halifax

## Director of the School

Klapstein, R.E., Associate Professor, LLM (Osgoode Hall), MBA, LLB (Dal), BA (Alberta), BSc (Calgary), CMA

## Director, Centre for International Business Studies

Brooks, M.R., BOT (McGill), MBA (Dal), PhD (Wales)

## Professors Emeritus

Brookbank, C.R., BA, MA, PhD (Toronto)  
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)  
Conrod, J.E.D., BComm (Dal), MBA (Toronto), CA  
Day, G., LLB (Dal), Fellow of University College (Cardiff) of the University of Wales, Chancellor, Chairholder - Herbert S. Lam Chair in Business Education  
Duffy, J.F., BS, MS, PhD (Iowa). Human resource management, business strategy, database design, database administration, user interfaces  
Fooladi, I., BS (Iran), MA (Tehran), MS, PhD (Oregon). Risk management and bond portfolio strategy.  
MacLean, L.C., BA, BEd (StFX), MA, PhD (Dal)  
Mealiea, L.W., AB, MBA (Rutgers), PhD (Mass)  
McNiven, J.D., BA, MA, PhD (Mich). Business/gov't relations and economic development policy.  
Oppong, A., BSc (Ghana), MBA (Chic), PhD (Iowa), CGA  
Rosson, P.J., DipMS (Salford), MA (Lancaster), PhD (Bath). International marketing, government assistance to exporters, company trade fair strategies.  
Sankar, Y., BA (McGill), MA (Toronto), PhD (Johns Hopkins)  
Schellinck, D.A., BSc, MBA (Dal), PhD (Illinois). Marketing informatics, the impact of international standards on the competitiveness of nations, international management education and research as an executive of international Federation of Scholarly Associations of Management, marketing research, bank marketing.

## Associate Professors

Archibald, B.C., BA (Queen's), MSc (Stanford), PhD (Waterloo)  
Blunden, R.G., BComm (Dal), MM (Northwestern), PhD (Western). Strategy formulation and implementation, entrepreneurship, family business.  
Carroll, R., BBA, BEd (StFX), MBA, PhD ((Dal), FCGA  
Cherry, D.C., BComm (Dal), MBA (McMaster), CMA. Financial and managerial accounting, international development, financial management.  
Dirksen, C.J., BS (Santa Clara), MBA, PhD (Oregon)  
Ellison, R.A., BSc (UNB), DBA (Tenn), MBA (McMaster), PhD (Tenn), PEng  
Gassmann, H.I., Vordiplom (Stuttgart), MS (Oregon State), PhD (UBC). Stochastic programming, operations research, financial applications, computer-aided modelling, algorithms  
Klapstein, R.E., LLM (Osgoode Hall), MBA, LLB (Dal), BA, (Alberta), BSc (Calgary), CMA  
Larsson, S.O., BSc (SGW), MSc (Alta), PhD (UBC)  
Marche, S., BA (Royal Military College), MEd (Alberta), PhD (LSE)  
Patton, D.J., BA (UNB), MA (Toronto), DBA (Indiana). International business; multinational corporations; international trade; exporting; business strategy; environment; environmental management; Asean; Indonesia; Phillippines  
Sagebien, J., BA (Hamshire), MA (Naropa), MBA (Simmons), PhD (LSE)  
Scott, E.W., BComm (Dal), MBA (Columbia), CA, CMA. Financial and managerial accounting; Canadian taxation  
Shafai, Y., BSc, MPA (Tehran), MBA, PhD (Michigan)  
Sharma, P., BSc, MBA (Panjab Agricultural University), PhD (Calgary). Succession issues in family business, entrepreneurship, strategic management.  
Street, R.A., BComm, LLB, LLM (Dal), MBA (Western)

## Assistant Professors

MacLean, B.W., BComm, MBA (Dal), CA  
McLarny, C., DipRadTech (Fanshawe), BComm, MBA (Windsor), PhD (York)  
Rumsey, J.D., AB (Berkeley), BEd (Toronto), MSc (Victoria), MBA, PhD (York)  
Sezer, O., BA (Ankara), MA (Boston), ABD, PhD (Connecticut)

## I. Introduction

### MBA Programme

The aim of the MBA programme is to prepare students to become effective managers in small or large organizations. The programme 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. While students may choose to concentrate elective studies in one or two areas, there is no requirement that a concentration be formally declared.

Additional information on the MBA programme, including 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 Programme Director, School of Business Administration.

Telephone: 1-888-432-5622

E-mail: [MBA.Admissions@Dal.Ca](mailto:MBA.Admissions@Dal.Ca)

Website: <http://www.mgmt.dal.ca/sba/mba>

NOTE: The core curriculum was altered in 1996. Students admitted to the MBA programme before this date should consult the calendar of the year admitted.

## 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 recognized by Dalhousie University as the equivalent of a Bachelor's Degree in one of its own faculties. Applicants are 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, but other criteria are considered.

The School of Business actively seeks applicants also having relevant full-time work experience, but some candidates will be admitted directly from undergraduate studies. A résumé and a personal statement should accompany every application.

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, Educational Testing Service, Box 966, Princeton, NJ, U.S.A. 08541. (1-800-GMAT-NOW or <http://www.gmat.org>) The minimum score required for admission is 500. Applicants may write the test more than once. Applicants who hold a previous Master's degree from a recognized institution may be exempted from the GMAT requirement. Please check with [mba.admissions@dal.ca](mailto:mba.admissions@dal.ca) to confirm this possibility.

Candidates whose native language is not English are required to submit results of the Test of English as a Foreign Language (TOEFL). Information on test dates, locations and registration can be obtained by writing to TOEFL, Educational Testing Service, P.O. Box 899, Princeton, NJ, U.S.A. 08540. (1-800-257-9547) Minimum TOEFL score for consideration is 580 (computerized score is 237).

Admission criteria and procedures are identical for the part-time and full-time programmes.

Approximately 100 students per year are accepted in the Regular MBA Programme for a September start. Deadlines are:

January 31	China
April 1	International - Other, and Canadian automatic scholarship consideration
June 1	Canadian - final deadline

Exceptional cases with a business degree may be allowed for January mid-year start.

Admissions are made on a rolling basis, for the following January with a firm deadline of November 1. All applications received later in the year will be considered for the following September admission. January admission is only allowed for applicants who can show achievement of B+ or better in a previous Business Degree. Interim (official) transcripts will be considered for candidates currently attending university, if all other documentation is complete. Since space in the programme is limited, all documents must be submitted before May 31 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 April 1.

A complete application includes:

- \$65.00 application fee
- Faculty of Graduate Studies application form
- Two reference letters, (academic)
- GMAT results
- TOEFL results, where applicable
- Letter of Financial Guarantee (non-Canadian applicants)
- Transcripts from each institution attended (two copies)
- A brief statement explaining how you expect the Dalhousie MBA to benefit you, and what you will contribute to the programme (two copies)
- Your résumé (two copies) one year

**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.** 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 Educational Testing Service. Applicants must score 500 or better on the GMAT, and 580 on the TOEFL (237 computerized) for consideration.

All admitted applicants must confirm in writing their acceptance of the offer of a place, and provide a non-refundable deposit of \$200. This fee 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:

- By April 30 for offers made before April 1
- Within 30 days for offers made between April 1 and June 15
- Within 10-15 days for offers made after June 1

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.

## 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 do not meet these requirements may not continue in the programme unless readmission 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.

When a failed class has been successfully repeated or replaced, only the repeated or replaced grade will be used to calculate the GPA. A second failure in the programme, regardless of when such failure occurs, will normally result in immediate dismissal from the MBA programme. 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 Programmes

### A. One Year MBA Programme Structure

Students with a recognized undergraduate degree in business (i.e., BCOMM, BBA, HBA) with a GPA of at least 3.3 and a GMAT of 550 or better, will be granted up to a maximum of seven half credits of Advanced Placement, reducing their total MBA programme to 13 classes. Students may receive exemptions for core classes for which a demonstrated overlap is shown, replacing exempted classes with electives of their choice. The minimum number of classes required is thirteen half credits. Normally, the one year MBA can be completed in ten months. It may also be completed in approximately 3 years as a part-time course of study.

#### Fall Term

- Five classes

#### Winter Term

- Five classes

#### Spring Term

- Three Classes

NOTE: The core classes will vary for individual students depending on their undergraduate classes. Please consult the MBA Programme Office for a personalized requirements listing by appointment.

### B. Two Year MBA Programme Structure

The two-year MBA programme includes twelve required core classes, one required non-credit class and eight free electives (five for LLB/MBA). All MBA classes are half-credit classes. Normally, the two-year MBA can be completed in 20 months. The minimum number of classes required of students in the two-year MBA programme is seventeen (17) half-credit classes. The maximum is (20) half-credit classes but students may get permission to take more.

Full-time students are normally required to carry a full class load in the first year, consisting of ten half-credit classes and one non-credit class.

#### First Term

- BUSI 5003.00: Communications and Career Management - Module 1 (non-credit)
- BUSI 5101.03: Accounting I
- BUSI 5503.03: Quantitative Decision Making
- BUSI 5511.03: Management Information Systems (formerly 6903.03). Cross-listing: LIBS 5505.03, PUAD 6925.03
- BUSI 5703.03: Business Economics
- BUSI 5801.03: International Business (formerly 6801.03)

#### Second Term

- BUSI 5003.00: Communications and Career Planning - Module 2 (non-credit)
- BUSI 5102.03: Accounting II
- BUSI 5201.03: Financial Management.
- BUSI 5305.03: Management of People (formerly 5311.03/5315.03)
- BUSI 5401.03: Marketing Management
- BUSI 5551.03: Production and Service Management

The second year normally consists of two required core classes and eight electives, to total ten classes.

#### Third Term

- BUSI 6004.03: Business Policy I: Strategy Formulation.  
Prerequisite: All first year required classes, or permission of the instructor.
- Four electives

#### Fourth Term

- BUSI 6005.03: Business Policy II: Strategy Implementation.  
Prerequisite: BUSI 6004.03
- Four electives

A variety of electives allows a student to develop a programme 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 four related electives of choice. A double concentration may also be accomplished with proper planning.

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, etc. Throughout the programme, 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.

### C. Part-time MBA Programme

The MBA degree may be earned through part-time study. A student must normally complete the requirements for the MBA degree within seven years of initial enrollment in the programme. Extensions may be granted in special cases upon petition to the Faculty of Graduate Studies.

Many core classes and a selection of electives are offered at night each year on a rotating basis, and several spring classes offered are scheduled at night. It is strongly suggested that part-time students complete all of the core classes first, before enrolling in elective classes.

There is no prescribed order of completion of classes in the part-time programme, except as dictated by class prerequisites. However, MBA 6004.03 (Strategy Formulation) and 6005.03 (Strategy Implementation) are among the last classes taken, since they provide an integration of the whole programme and require a major field project.

No more than five (5) half-credit classes may be taken in each twelve month academic year, including spring sessions. Only Graduate level classes will be eligible for credit.

Part-time MBA students will be enrolled in classes together with full-time MBA students.

### D. Combined LLB and MBA Programme

This is a four-year programme which enables students to select classes leading to the degrees of Bachelor of Laws and Master of Business Administration. The usual order of the programme is:

#### Year 1

- First-year classes of MBA programme, with a minimum of ten half-credit classes. See "Two Year MBA Programme Structure" for details.

#### Year 2

- First-year classes of the LLB programme

#### Year 3

- Three half-credit classes from the MBA programme
- 25 hours of classes from the LLB programme, including 7/9 hours from the Business Law area

#### Year 4

- Four half-credit classes, including BUSI 6004.03A and 6005.03B from the MBA programme
- Between 23 and 25 hours of classes in law.

Candidates for the LLB/MBA programme must satisfy the entrance requirements of the Faculty of Law (see Dentistry, Law and Medicine calendar) and may obtain further information about the combined programme by writing either to the Faculty of Law or to the Coordinator of the MBA programme. For admission, students must

apply to both the Law School and the Business School, separately. Both admission tests (GMAT and LSAT) are usually required -- one for each school.

### E. Advanced Placement and Exemptions

Students with relevant academic background may receive advanced placement or exemption for core classes in the MBA programme. For further information, contact the MBA Coordinator. Full-time students will not normally be permitted to carry less than a full work load in the first year of the programme, regardless of the number of waivers granted.

Students may only apply for advanced placement or exemptions before their programme of study forms have been officially signed and approved.

### F. Concentrations

A concentration is generally the core class plus four electives. While some suggested concentrations are listed below, students may make up their own desired field of concentration. With proper planning, a double concentration may be possible.

#### Environmental Management

Environmental threats and opportunities are becoming increasingly relevant to business. To prepare managers to respond to this growing challenge, with its ethical, legal, social and managerial dimensions, the Dalhousie School of Business Administration, in conjunction with the School for Resource and Environmental Studies, offers a MBA concentration in Environmental Management.

Students choosing this area of concentration must complete the following prescribed classes:

- BUSI 6813.03 Management and the Natural Environment
- BUSI 6816.03 Environmental Management Systems for Business
- ENVI 5002.03 Environmental Impact Assessment
- ENVI 5004.03 Management of Chemicals and Wastes
- ENVI 5200.03 Environmental Law

Additional classes are available as electives, including Industrial Ecology, Resource Systems & Economic Development, Environmental Policy, and Environmental Ecology. A large number of related elective classes are offered by the Faculty of Management and other Dalhousie faculties.

#### Finance

The Dalhousie School of Business finance programme enjoys an enviable reputation within Canada's financial community for the outstanding work of its faculty and the quality of its graduates. In addition to solid backgrounds in both finance theory and practice, Dalhousie MBA graduates are recognized for their leading edge view of the financial industry. 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 are expected to complete as many finance electives as possible including Investments I (6201), Financial Institutions (6203), Capital Budgeting (6205), and Portfolio Theory (6206).

#### Information Systems/Information Technology

In today's increasingly complex and fast paced environment, information systems and technology have become critical to both the strategic and day-to-day success of the business. In manufacturing, marketing and service sectors, investment in information technology can account for a significant percentage of annual capital expenditures. With this heightened level of investment has come the need for managers with the specialized knowledge and skills to manage these assets for optimum efficiency and relevance.

To answer this need, the School of Business, in conjunction with the School of Library and Information Studies, offers an MBA concentration in Information Systems/Information Technology Management.

This exciting programme focuses on emerging technologies, the internet and world wide web, electronic commerce, data mining, intranets, expert systems, and groupware, as well as management issues, such as system analysis and design and database management.

Students choosing this field of study must complete the introductory class, Management Information Systems (5511), and earn four credits from current Management and Information Sciences class offerings. Additionally, a minimum of four electives are selected from over 19 related classes offered by the Dalhousie Faculty of Management or at other universities in the Halifax area.

#### International Business

Students choosing International Business as their area of concentration must complete International Business (5801) and Strategic Management of International Operations (6802), plus any two IB electives from the following list:

- BUSI 6815.03 Doing Business Effectively in Asia
- BUSI 6817.03 Doing Business in the Americas
- BUSI 6816.03 Environmental Management Systems for Business
- BUSI 6812.03 Foreign Business Programme
- BUSI 6315.03 Intercultural and Comparative Management
- BUSI 6808.03 International Banking
- BUSI 6807.03 International Financial Management
- BUSI 6806.03 International Marketing
- BUSI 6803.03 International Transportation
- BUSI 6818.03 Finance under NAFTA
- BUSI 6819.03 Marketing under NAFTA
- BUSI 6813.03 Management and the Natural Environment, An International Perspective
- Intercultural and Comparative Management is strongly recommended, and is required of Fellowship recipients.

In addition to class 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. From an annual Foreign Business programme and World Business Forum Speaker Series to internship programs and case competitions, the MBA programme at Dalhousie has much to offer.

Students hoping to be considered for International Business Fellowship are expected to complete: 5801.03 International Business, 6802.03 Strategic Management of International Operations, 6315.03 Intercultural and Comparative Management, and at least one of the other International business classes offered by the School.

#### Marketing Management, Logistics, and Informatics

It is said that marketing is the discipline of managing relationships between the organization and its external customer environment. Marketing classes provide insight into the market forces and organizational skills needed to develop and execute successful marketing strategies. Transportation classes reflect Halifax's role as one of Canada's most important international transportation gateways.

A wide choice of electives covers the many activities organizations use to develop, promote, and distribute products and services. Through lectures, casework and project assignments, students learn to develop effective marketing plans and strategies and to define and serve customer needs. Students also learn to integrate regulatory issues, ethical issues, and capital return requirements in a competitive marketplace.

In addition to the core Marketing Management class (BUSI 5401.03), students choosing a Marketing and Transportation concentration are required to complete Marketing Research (BUSI 6401.03) and the Marketing Strategy Seminar (BUSI 6450.03), along with a minimum of two other Marketing and Transportation Electives.

Other recommended classes include Buyer Behaviour, International Marketing, Advertising Management, Marketing Channels, Sales Management, Domestic Transportation, and Logistics Management.

## G. MBA (Information Technology) Programme

This distance based MBA is a programme of the specialized Office of External Graduate Programmes (OEGP) housed in the School of Business Administration. Dalhousie University and ITI-Information Technology Institute have joined forces to bring you Canada's first MBA in Information Technology (IT). Designed in consultation with key industry leaders and building upon the expertise of both institutions, it represents an exciting new breed of MBA programming.

Beginning in February 1999, the MBA (IT) Programme has offered students the opportunity to gain both the technical skills and the management training that are necessary to succeed in the knowledge-based economy.

### 1. Admission Requirements

The requirements for this programme are successful acceptance into the ITI Applied Information Technology Programme and acceptance by the Faculty of Graduate Studies into Dalhousie's MBA programme. When applying for Admission please note that each programme is processed separately and you must meet the admission requirements for both schools.

The MBA(IT) admission requirements are as follows:

1. Minimum 3.0 GPA in your undergraduate programme;
2. A minimum score of 500 in the GMAT;
3. A Dalhousie University application;
4. \$65 application fee;
5. Official transcripts from all post-secondary institutions;
6. 2 letters of reference (at least one academic reference);
7. TOEFL results, where applicable. 580 minimum score (237 computerized test)

**The ten Business Administration classes are offered via distance education format, part-time. Each class is followed by a three-day intensive learning session which includes the final exam.** All of the above information should be sent directly to the MBA(IT), Admissions Officer.

### 2. Contact

Students seeking further information should contact:

Marianne R. Hagen  
Admissions Officer for MBA (IT), MBA (FS), MPA  
(Management)  
School of Business Administration  
6152 Coburg Road  
HALIFAX, NS B3H 3J5  
Telephone: 902-494-7142  
Toll Free: 1-800-205-7510  
Fax: 902-494-5164  
E-mail: [oegp@mgmt.dal.ca](mailto:oegp@mgmt.dal.ca)  
Website: <http://mbafs.mgmt.dal.ca/>  
MBA (Financial Services)  
<http://mba-it.mgmt.dal.ca/>  
MBA (Information Technology)

## H. MBA (Financial Services) Programme

This distanced based MBA is a programme of the specialized Office of External Graduate Programmes (OEGP) housed in the School of Business Administration. This MBA degree is designed to further prepare managers in the financial services industry to exercise leadership, sound general business knowledge, analytical skills and judgment in their managerial and client service roles. The MBA (Financial Services) consists of sixteen graduate level classes, including seven or eight classes offered by the Institute of Canadian Bankers through the Professional Banking programme (PBP) or the Personal Financial Planning (PFP) and Personal Trust programme (PTP), and nine classes provided by the School of Business Administration. To be eligible for admission to the programme, applicants will be required to have successfully completed a minimum of four approved ICB classes and either meet the normal undergraduate requirements for admission to the

MBA programme at Dalhousie, or possess at least five years experience in relevant management positions within a financial institution. Once accepted to the programme, a student must complete the requirements for the MBA (Financial Services) degree within seven years.

**The nine Business Administration classes are offered via a distance education format, using university texts supplemented with teaching notes prepared by university professors.** Each of the initial eight core classes in the programme will consist of 17 weeks of distance study and assignments, followed by a three- or four-day intensive learning session. The capstone class, Strategic Leadership and Change, consists of 9 weeks of distance study and assignments, followed by a one week intensive learning session conducted at Dalhousie University.

The programme offers two academic terms per year, commencing in mid September and mid February; admissions are made for either term. There will be four classes available in each term. Classes will only be offered if there are an acceptable minimum number of students enrolled in a class section. The capstone class is offered during the summer between the two regular terms.

There is no prescribed order of completion of classes in the programme, except as dictated by class prerequisites. However, a student may only enrol in the capstone class after having successfully completed the preceding 15 classes in the programme.

### 1. Application Procedure

For the 2001/2002 academic year, applications (including all supporting documents) must be post-marked no later than June 1, for the term commencing September 2001, and no later than November 15 for the term commencing February 2002. A complete application includes:

- Faculty of Graduate Studies Application for Admission
- Two letters of reference (one academic, one employment)
- One original transcript from each educational institution attended
- One original ICB transcript
- One copy of your resume
- One Confirmation of Employment Record

### 2. Classes

The classes available to students in the MBA (Financial Services) programme are:

#### September Term

- BUSI 5103.03: Accounting
- BUSI 5503.03: Quantitative Decision Making
- BUSI 6317.03: Management in a Multicultural Setting
- BUSI 5801.03: International Business

#### February Term

- BUSI 5703.03: Business Economics
- BUSI 6207.03: Advanced Corporate Finance
- BUSI 6326.03: Management Skills Development
- BUSI 6410.03: Advanced Marketing

#### Summer Term

- BUSI 6990.03: Strategic Leadership and Change
- A second class to be announced each season.

**MBA (Financial Services) students are permitted to take these classes in the distance format only.**

### 3. Contact

Students seeking further information should contact the MBA (Financial Services) Office at:

Marianne R. Hagen  
Admissions Officer for MBA (IT), MBA (FS), MPA  
(Management)  
School of Business Administration  
6152 Coburg Road  
HALIFAX, NS B3H 3J5  
Telephone: 902-494-7142  
Toll Free: 1-800-205-7510  
Fax: 902-494-5164  
E-mail: [oegp@mgmt.dal.ca](mailto:oegp@mgmt.dal.ca)

Website: <http://mbafs.mgmt.dal.ca/>  
MBA (Financial Services)  
<http://mba-it.mgmt.dal.ca/>  
MBA (Information Technology)

## V. Core Classes for Regular Stream MBA

### **BUSI 5003.00: Business Communications and Career Management (non-credit).**

This required non-credit class is designed to make students more effective communicators, focusing on the oral and written communication skills which are vitally important for success in both education and work. The career management component assists students in further developing their understanding and appreciation of themselves, and in gathering and analyzing additional information about the business environments in which they will be managing their careers.

### **BUSI 5101.03/5102.03: : Accounting I and II.**

These core classes introduce the principles and practices necessary to process and communicate information about an organization to different user groups. The emphasis is on financial statement accounting, reporting, analysis, and management information needs. Topics covered include: accounting information used to measure return and risk; the measurement principles and their impact on the reliability of the accounting information; financial statement analysis; cost allocation; generally accepted accounting principles and information needs for planning, control, and decision making.

### **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. The instruction methodology includes lectures, cases, assignments, and spreadsheet analysis. Major topics, including valuation, working capital management, capital budgeting, long-term financing, capital structure, and dividend policy are tied together through emphasis on basic financial theoretical principles.

### **BUSI 5305.03: Managing People.**

This class helps to build understanding in dealing effectively with human problems in organizations. The focus of the class is management behaviour in the process of working with people to produce effective results. Some of the topics covered in this class are motivation, leadership, communications perception, values and ethics, personality leadership, organizational politics, group dynamics, inter-group behaviour, basic human resource functions, and strategies for optimizing human resources.

### **BUSI 5401.03: Marketing Management.**

Marketing Management is concerned primarily with problem-solving and decision-making situations which confront management in the administration of marketing operations. The class seeks to develop an understanding of the dynamics of market demand, considers the elements of the marketing mix, and shows how the enterprise's operations may be adapted to the marketing environment. The goal of this class is to develop skill in the sound analysis of given marketing situations, resulting in effective management action to capitalize on opportunities. Instruction will be a mixture of case discussions, projects, and lectures.

### **BUSI 5503.03: Quantitative Decision Making.**

This is an introductory class in quantitative methods with emphasis on business applications. Topics covered in statistics include: descriptive statistics, elementary rules in probability, random variables, distribution functions, expectations, sampling distributions, methods of sampling, classical estimation and hypothesis testing, simple and multiple regression, and correlation. Topics covered in operations research include decision analysis and linear programming. 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. Hardware configurations, software concepts and systems, and data base management issues, as well as system analysis, design, and evaluation will be introduced. Operating, tactical, and strategic management uses of MIS are covered. Applications from marketing, purchasing, production, personnel management, and finance will be studied.

### **BUSI 5551.03: Production and Service 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 within 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. The class will focus on the microeconomic analysis of the industry-specific economic forces affecting an individual firm, as well as, to a lesser extent, macroeconomic analysis of the determinants of aggregate output, inflation, unemployment, interest rates, and exchange rates.

### **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. It begins by tracing the growth in world trade in the post-World War II period, looking at the evolution of major trading nations (the US, Germany, Japan), examines the emergence of major trading blocs (EC, ASEAN, NAFTA), and analyzes the role and performance of institutions involved in world trade (World Bank, IMF, international financial institutions). A second part of the class deals with the various methods through which firms of all sizes do business overseas, but with particular attention paid to the dominant role played by multinational corporations. The trading history, performance, and problems of Canadian firms receive special attention. A final section will deal with the social and cultural sensitivity and adaptation required of businesses engaged in foreign operations, with an emphasis on evaluating responses to such diverse business situations.

### **BUSI 6004.03: Strategy Formulation.**

Strategy formulation is the first of two required classes in strategic management which form the capstone of the MBA programme. They are about general management-the practice of managing a business from the perspective of the general manager. Strategy Formulation explores the nature of effective strategies and develops students' skills in evaluating and formulating strategies. To do so the class examines the role of the general manager in the organization, environmental, and industry factors, the impact of personal values on strategy, and organizational resources and capability constraints. Students are exposed to a wide variety of organizations through case studies, and have the opportunity to examine a single organization in detail through field projects. The field projects which are completed in small groups, put students in the role of consultants to actual organizations, addressing strategic and operating issues of concern to them.

### **BUSI 6005.03: Strategy Implementation.**

Strategy Implementation picks up where Strategy Formulation leaves off. While Strategy Formulation is focused on the "what" of strategy (what should the organization be? What should it do?) Strategy Implementation focuses on how the strategy should be achieved. How should the business implement its strategy? How should it

proceed? Such questions are complex, situational, and not easily answered. The class develops students' abilities to understand the complex issues of implementing strategies and managing strategic change in all types of organizations. Like Strategy Formulation, it uses case studies extensively to expose students to a wide variety of organizations and situations. Similarly, it allows students to understand a single organization in detail through a group field project where students, serving as consultants, develop detailed strategic proposals and implementation plans for actual organizations

## VI. Elective Classes

**NOTE:** Classes marked with an \* are not offered every year. Please consult the university timetable for a list of current offerings.

### Accounting Electives

#### **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. This part includes pronouncements of the accounting profession, reporting standards, professional ethics, statute laws, legal liability and responsibilities, standards for examination of internal control in both manual and computerized environments, standards for the quality of evidence, statistical sampling and the sufficiency of evidence, documentation, and working papers. The second half of the class considers typical audit programmes for examination of balance sheet and income statement accounts.

FORMAT: Seminar

PREREQUISITE: BUSI 5102.03

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. Topics covered include computation of income from employment, business, and property; capital gains and losses; taxable income and taxes payable, for individuals and corporations; and tax planning. The class is revised each term to provide up-to-date coverage in a rapidly changing taxation environment.

FORMAT: Seminar

PREREQUISITE: BUSI 5102.03, 5703.03

CROSS-LISTING: COMM 4120.03

#### **\*BUSI 6103.03: Advanced Taxation.**

This class is a follow-up to 6102 and provides a more detailed examination of the corporate taxation system in Canada. It demonstrates, with some examples, how tax awareness and planning can be a significant element in the regular business decision-making process for both individuals and corporations, especially private corporations. Students will make seminar presentations of their researched topics.

FORMAT: Seminar

PREREQUISITE: 6102.03

CROSS-LISTING: COMM 4121.03

#### **BUSI 6106.03: Cost and Management Accounting.**

This class provides an in-depth understanding and rigorous applications of the managerial/cost accounting concepts introduced in 5102. Most of the topics introduced in 5102 are re-examined, with the objective of developing professional accounting skills. Additional topics to be covered include cost allocation systems, modern product costing systems (such as activity-based costing, just-in-time systems, and backflush costing) in automated manufacturing settings, standard costing, and budgeting. Computer spreadsheets are used to solve some standard cost accounting problems, such as budgeting and cost allocations.

FORMAT: Lecture

PREREQUISITE: BUSI 5703.03 or permission of the instructor

CROSS-LISTING: COMM 3112.03

#### **BUSI 6108.03: Advanced Financial Accounting I.**

This class and its follow-up, BUSI 6109.03, are meant to provide an understanding of corporate financial reporting and the related conceptual framework. The class develops technical expertise in various financial accounting topics, some of which were introduced in 5101 and 5102. The focus is on understanding the implicit interrelationships in the framework, and the environmental factors that work to establish generally accepted accounting principles (GAAP).

FORMAT: Lecture

PREREQUISITE: BUSI 5102.03 or permission of the instructor

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, and consolidated financial statements and foreign operation; second, to develop a framework that may help to resolve controversial issues in advanced financial accounting. The class makes extensive use of case analysis and problems.

FORMAT: Lecture

PREREQUISITE: BUSI 6108.03 or permission of the instructor

CROSS-LISTING: COMM 4102.03

#### **BUSI 6110.03: Advanced Financial Accounting III.**

This class covers intermediate and advanced topics in accounting, as well as several specialized accounting issues. The following is a list of some of the topics covered in the class: non-profit accounting, current accounting standards, special industry accounting, valuation, capital market theory and information efficiency, estates and trusts, and bankruptcy. In addition, the class provides an in-depth review of some topics treated in prerequisite classes. Guest speakers are invited occasionally to share their knowledge on some specialized accounting issues.

#### **\*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 learning, prediction of financial distress, and the relationship between financial statement numbers and behaviour of stock prices. The class also examines the preparation and interpretation of alternatives to conventionally prepared financial statements.

FORMAT: Lecture

PREREQUISITES: BUSI 5102.03, 5201.03, and 5503.03

#### **BUSI 6113.03: Advanced Financial Accounting IV.**

This class and its prerequisite, 6108, are meant to provide an understanding of corporate financial reporting and the related conceptual framework. The class examines the assumptions underlying topics in the external reporting model, and the consequences of relaxing those assumptions in, for instance, the study of accounting measurement models. Quantitative technical skills are emphasized simultaneously with the qualitative factors governing accounting policy choices.

PREREQUISITE: BUSI 6108.03

#### **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, including standards for acquisition, development, implementation, conversion, testing, and maintenance of systems. The class also covers 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. For each special internal control technique, there exists a number of possible audit procedures. Audit strategy is considered, including auditing around the system, reliance on and examination of computerized controls, and computer-assisted audit techniques. (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

PREREQUISITES: BUSI 5102.03, 5511.03

## Finance Electives

### **BUSI 6201.03: Investments I.**

This class covers investment theory and its applications to practitioners and investment analysts. Students employ quantitative tools of investment and security analysis, financial models, statistics, and software, along with standard library sources, to write investment reports. Class format is lecture and discussion. Grade evaluation includes term paper, examinations, and the Toronto-Dominion investment game.

FORMAT: Lecture

PREREQUISITE: BUSI 5201.03.03.

RECOMMENDED: BUSI 5102.03

### **\*BUSI 6202.03: Derivative 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. Participants are required to conduct original applied empirical research. Class format is lecture and discussion.

FORMAT: Lecture

PREREQUISITES: BUSI 5201.03, BUSI 6201.03

### **BUSI 6203.03: Financial Institutions.**

The objectives of the 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. The primary topics considered include: (a) the nature of the capital markets and their associated financial assets/financial liabilities; (b) a capital market model of the savings-investment function which is used to evaluate flow-of-funds data; (c) the participants (investors and borrowers) in the various segments of the market; (d) the role of individuals and non-financial firms in the system; and (e) domestic-international market linkages. These topics are handled in terms of reading assignments, research cases, and classroom discussion. Student assignments and seminars on assigned topics play an important role in this class.

FORMAT: Lecture

PREREQUISITE: BUSI 5201.03.

RECOMMENDED: BUSI 5102.03

### **BUSI 6205.03: Capital Budgeting.**

This class provides an exposure to the decision-making process involving capital expenditures and fixed asset replacement problems. The importance and usefulness of capital budgeting techniques are shown by applying them in a variety of contexts. Main topics covered include long-term investment criteria, risk analysis for capital budgeting, cost of capital, financial structure, and lease versus buy. The content will be both analytical and quantitative in nature. Emphasis will be on the impact of capital expenditure decisions on the value of the firm. The class makes use of case analysis as well as real-world projects as teaching vehicles.

FORMAT: Lecture

PREREQUISITE: BUSI 5201.03

### **BUSI 6206.03: Portfolio Theory.**

This class is designed to introduce to students a modern theory of investment and finance, portfolio theory, and to discuss its applications to individual investors and financial institutions. It covers a thorough review of portfolio theory from Markowitz to the latest developments in the field in order to provide students with the needed skills to face, successful, the challenging world of portfolio and money management. Regular classroom lectures and problem-solving methods are used throughout the term, but students will also be heavily exposed to the approaches taken by money managers and to the literature from this industry. A project, involving the analysis of actual data, is also used as a teaching instrument.

FORMAT: Lecture

PREREQUISITE: BUSI 5201.03

### **BUSI 6208.03: Mergers, Acquisitions and Corporate Restructuring.**

The aim of this class is to provide both introductory and in-depth analyses of contemporary corporate control topics in finance. It will cover topics related to all types of corporate restructuring decisions, including mergers and acquisitions, divestitures, leveraged buyouts (LBO's), and reverse LBO's. If time permits, it will also cover Independent Public Offerings (IPO's) and corporate bankruptcy. Topics will be examined from both a theoretical and a practical viewpoint with emphasis on the practical side. Topics will include: how to choose an appropriate restructuring vehicle, valuation techniques, strategic issues, how to finance restructuring, tax implications, how to estimate the impact of the restructuring decision on stock price, and how to determine if the restructuring was successful.

The material for the class will be based on a selection of readings from textbooks, current articles from major finance journals, and court testimony from a landmark case. There will also be attention to the current press articles about recent restructuring, and some case studies will be used in the class. Students will be required to present their own case dealing with a recent Canadian acquisition.

### **BUSI 6250.03: Theory of Finance.**

This class is intended to enhance students' understanding of the theory of finance to a level which enables them to critique current research published in academic journals, and to apply selected research to financial management issues. The class is designed with the assumption that students have a background in financial economics. In addition to the main text, several journal articles will be reviewed in each area. Seminar style classes will feature discussion and student participation.

FORMAT: Seminar

PREREQUISITE: Concentration in Finance and permission of the instructor.

### **BUSI 6807.03: International Financial Management.**

There are two distinct but related parts to this class. In the first, the macro environment in which international financial decisions are made is studied. Topics include: theories and policies of international adjustments, foreign exchange rates and the forward market, capital flows, hedging, arbitrage and the efficiency of foreign exchange markets, forecasting, foreign direct investment and risk diversification, and the Eurocurrency market. The second part of the class has a micro focus. This permits a detailed examination of the modern theory of foreign exchange from the standpoint of the multinational enterprise, its exposure to international risk, taxation and transfer pricing, cost of capital and sources of funds for the multinational enterprise, international capital budgeting, and management of the finance function.

FORMAT: Seminar

PREREQUISITES: BUSI 5703.04, 5201.03 and 5102.03

RECOMMENDED: BUSI 5801.03, strongly recommended

CROSS-LISTING: COMM 4201.03

### **BUSI 6808.03: International Banking.**

See International Business electives.

FORMAT: Seminar

PREREQUISITE: BUSI 5703.04

RECOMMENDED: BUSI 5801.03 (strongly recommended)

## Human Resource Management Electives

### **BUSI 5331.03: Labour-Management Relations.**

This is an introductory class in industrial relations for MBA and other graduate students who have had little or no prior work in the area. As an introductory class, it is designed to cover a broad subject matter of relevance to future managers and union leaders. Five areas will receive major attention: the participants in industrial relationships, the legal framework governing participants' behaviour, union organizing strategies, contract administration (grievance procedures and arbitration), and the building of industrial relations systems which will meet the strategic needs of the firm.

### **BUSI 6312.03: Organizational Design.**

The behaviour 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 class 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 behaviour and performance in organizational systems employing different design strategies. The class 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 will be placed on the analysis of the dynamics and process of change through case studies, and the exploration of programmes of organizational change, including grid and laboratory programmes, and the use of consultation.

FORMAT: Lecture/seminar

PREREQUISITE: BUSI 5305.03

### **BUSI 6315.03: Intellectual and Comparative Management.**

This class is designed to familiarize participants with behavioural problems and challenges facing managers interacting with people from other cultures in foreign or domestic work settings. The class will also examine research findings in the field to investigate the similarities and differences found in managerial practices of selected cultures. Designed primarily for management generalists and staff specialists, it is intended to develop the sensitivity and understanding necessary to operate effectively in a wide variety of cultural contexts. A combination of lectures, guest lectures, group case studies, experiential exercises, film, videos, student presentations, and class discussions will be employed to cover the class content.

FORMAT: Lecture

PREREQUISITE: BUSI 5801.03 or permission of the instructor

### **BUSI 6322.03: Selection - Testing & Interviewing.**

This class considers the strategies and problems in personnel selection and examines its impact on organizational effectiveness. Topics include: basic selection models; job analysis; interviewing theory, methods, and uses. The description and evaluation of the usefulness of selection techniques such as personnel tests, interviews, biographical data, and managerial assessment centres; decision-making strategies in personnel selection; and human rights legislation in Canada will also be covered. 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 or permission of the instructor

### **BUSI 6323.03: Training & Development.**

This class will cover methods currently employed in the training and development field. The primary purpose will be to develop students' expertise in the training and development area, and will employ such learning techniques as structured exercises, guest lecturers, role plays, and videos. Students will also be exposed to the most current research findings which directly relate to effective training and development within today's complex organizations. Specifically, the student will learn to: identify micro and macro training/development needs; plan and organize appropriate training/development programmes; implement pre-planned training/development programmes; and evaluate the effectiveness of training/development efforts. Since all managers have to develop themselves and their subordinates, this class will be relevant for generalists as well as human resource specialists.

FORMAT: Seminar

PREREQUISITE: BUSI 5305.03 or permission of the instructor

### **BUSI 6324.03: Performance Appraisal & Compensation.**

This class will expose the student to current practice and theory in the area. The objectives are: to learn and practice equitable job evaluations; to teach the student the difference between and the correct use of various performance rating formats; to develop an understanding of the relationship between pay, performance, and satisfaction in a variety of organizational settings; to improve the student's unbiased rating skills; to practice effective feedback of performance appraisals; to understand the concepts behind various fringe benefit packages; and to evaluate the effectiveness of performance appraisal and compensation policies. Lectures, readings, case studies, role plays, and video tape behavioural modeling will be used to achieve these objectives.

FORMAT: Seminar/lecture

PREREQUISITE: BUSI 5305.03 or permission of the instructor

### **BUSI 6326.03: Management Skills Development.**

This class will expose students to key knowledge, skills, and attitudes (KSAs) considered critical to managerial success. Such an exposure is designed to provide the student with behaviours which will help ensure that, when managing human resources, staff will perform at or near peak capabilities. This is a skill-building class. Specifically, students will be able to: (a) articulate the key KSAs necessary to help ensure managerial success, (b) identify and describe appropriate support behaviour for each KSA, (c) assess one's own personal strengths and weaknesses for each KSA, (d) develop acceptable proficiency levels for each KSA, and (3) interact effectively with other managers and staff so as to help ensure high levels of productivity. Topic areas include: understanding what a successful manager needs to know, understanding the personal self, communications, interpersonal negotiations, goal setting, managing innovation and change, handling conflict and anger, performance evaluation, counselling and feedback, and management attitudes needed for success. Significant amounts of classroom time will be devoted to behaviour modeling exercises, role plays, case studies, and group discussions.

FORMAT: Seminar

PREREQUISITE: BUSI 5305.03 or permission of the instructor

### **\*BUSI 6332.03: Negotiation and Collective Bargaining.**

This class examines the processes of union organization and certification, from the perspective of management. Major attention is given to collective bargaining and the negotiation process, in both the private and public sectors. Attention is given to legal and illegal strikes, as well as other job actions.

FORMAT: Seminar

### **BUSI 6333.03: Comparative Labour Relations.**

This class provides a systematic cross-cultural analysis of management-union-government relations and an examination of theoretical and practical aspects of contrasting industrial relations systems. Each student is expected to study in depth one or more industrial relations systems in other countries and to prepare a major paper dealing with this research.

## **International Business Electives**

### **BUSI 6315.03: Intercultural and Comparative Management.**

See Human Resources Management Electives

### **BUSI 6802.03: Strategic Management of International Operations.**

Large cross-border movements of goods, services, capital, and technology increasingly demand a global view of the firm's strategy and operations. Some international corporations seek competitive advantage through coordination of geographically dispersed units, while others choose to tailor their international operations to the economic, political, and social aspirations of diverse national governments.

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 6803.03: International Transportation.**

The general objective of the class is to provide students with a conceptual and factual overview of international transportation from a Canadian perspective. The focus will be primarily on shipping, as this is the predominant form of transportation for goods destined for overseas markets; however, some time will be spent on international air cargo, truck, and rail services. Over the term, the following general topics will be addressed: the market structure in transportation, cargo systems, common carriers, and chartering; ship finance and operating decisions; airplane investment and operations; documentation, and regulation.

FORMAT: Seminar

RECOMMENDED: BUSI 5801.03

### **\*BUSI 6805.03: Seminar on Marine Resources and Ocean Industry.**

The class objective is to introduce seminar participants to the nature and operations of ocean business, both traditional and modern. The content recognizes both national and international dimensions in such areas as policy, ownership, technology, finance, marketing, and operations. In the process, participants are also made aware of the relevant aspects of ocean management and law. Specialists from business, government, and the academic community address the seminar on their particular areas of expertise. The class moderator provides for the integration of the material, drawing out the business implications of each aspect. A major research paper is required.

FORMAT: Seminar

### **BUSI 6806.03: International Marketing.**

This class examines the process by which firms expand their operations to foreign markets, the decisions that must typically be made along the way, and how these decisions might best be made. Some lecturing will take place, but a heavy emphasis is given to case discussions and project work. Projects may be based on actual firms or on a topic of interest to the student. Project presentations form an important part of the class. Case discussions will focus on companies of contrasting sizes, with different product/service offerings, at varying stages of marketing involvement overseas, and selling into a range of geographic markets. However, emphasis is placed on smaller firms, since these often face the greatest problems and are more typical of Atlantic Canada.

FORMAT: Seminar

### **BUSI 6807.03: International Financial Management.**

See Finance Electives.

### **BUSI 6808.03: International Banking.**

This class introduces students to the global nature of financial markets and the role of international banking. The class is being offered at a time when the problem of rescheduling, which followed a dramatic increase in international lending, has now led many banks to examine their lending practices and to move away from sovereign lending back to corporate lending. Instruction methods include lectures, class and case presentations, and case assignments.

### **BUSI 6812.03: Foreign Business Programme.**

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, 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. In recent years, students have gone to Europe.

PREREQUISITE: BUSI 5801.03

### **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 effects that industrial, agribusiness and other human activities have on the bio-physical environment. While urgent questions are raised at all levels - local, regional, national, and international - the perspective of senior management in large multinational enterprises operating in environmentally sensitive industries is taken in this class. The class examines those questions which pointedly and forcefully confront multinational enterprises and explore the choices decision makers must make within a complex of different economies, markets, cultures, social systems and, perhaps most important, regulatory regimes.

CROSS-LISTING: ENVI 5818.03

### **BUSI 6815.03: Doing Business Effectively in the Asia-Pacific Region.**

The class will focus on the opportunities for trade and investment between Canada and the countries of ASEAN and East Asia, as well as Japan. The class will study opportunities that have been identified by contact with Canadian Embassies in the ASEAN region, East Asia, and Japan, as well as the main methods for transacting business in these locations. A variety of learning approaches will be employed. The class will be team taught by senior faculty associated with the Centre for International Business Studies and who have first-hand experience in the Asia-Pacific region.

FORMAT: Lecture/seminar

PREREQUISITE: BUSI 5801.03

CO-REQUISITE: BUSI 6802.03 or permission of the instructor.

### **BUSI 6816.03: Environmental Management Systems for Business.**

Environmental threats and opportunities are becoming increasingly important for business. Environmental problems such as climate change, ozone depletion and loss of biodiversity have become important national and international issues. Governments continue to adopt regulations and standards which influence industrial activity on a daily basis. Banks, insurance companies and other investors have become conscious of liabilities imposed by improper handling of materials and contamination of property. Suppliers and customers are also setting their own requirements. With the advent of the Business Charter on Sustainable Development, the European Environmental Management and Audit Scheme and the ISO series of environmental standards, companies are responding to these challenges by establishing structured environmental management systems.

Class sessions comprise lectures, discussions, addresses by practicing managers and business leaders, as well as individual and group presentations. The major component of this class is the preparation by teams of students of environmental management systems for local companies.

PREREQUISITE: BUSI 5801.03, 6813.03

CROSS-LISTING: ENVI 5819.03

### **BUSI 6818.03: Finance Under NAFTA.**

Students taking this class must be enrolled in the Pan-American Program. Travel is required.

By the end of this class, students should have an understanding of NAFTA as it affects the financial management of firms within the participating countries, the factors essential to the investment decision and the daily operations of firms, and the function of capital markets, especially banking and money market activities. This class is part of a developing programme that involves collaboration between four institutions: Dalhousie University, HEC (Canada), Pace University (USA), and ITESM (Mexico).

### **BUSI 6819.03: Marketing Under NAFTA.**

Students taking this class must be enrolled in the Pan-American Program. Travel is required.

This class will enable students to develop (1) an understanding of the NAFTA as it affects the marketing operations of firms in the signatory nations, (2) an appreciation of the critical issues facing firms who plan to market within NAFTA, either for the first time or as an expansion of existing operations, and (3) practical skills in solving typical NAFTA marketing problems. A mixture of methods will be

used, including lectures, case discussions, visiting speakers and visits. The first part of the class will be delivered on campus at Dalhousie. The second part will take place in New York City. This class is part of a developing programme that involves collaboration between the following universities: Dalhousie University and HEC (Canada), Pace University (USA), and ITESM (Mexico). An important goal is the provision of educational programming that focuses on NAFTA and includes the participation of students and faculty from the three signatory nations. The second part of the class will build on the fact that some 40 students from the three nations will be present in NYC and exposed to speakers from a variety of important organizations, as well as able to visit major corporations and institutions.

## **Management and Information Sciences Electives**

### **\*BUSI 6501.03: Operations Research.**

This class continues the search for “best” solutions of problems which can be formulated as mathematical models. It considers extensions of linear programming (such as integer, nonlinear, and stochastic programming). It also considers the usefulness of simple rules or heuristics for obtaining “good” suboptimal solutions in place of the complex rules for precisely optimal solutions.

FORMAT: Lecture

PREREQUISITE: BUSI 5503.03

CROSS-LISTING: COMM 4501.03

### **\*BUSI 6504.03: Applied Statistics.**

The convenience of packaged statistical programmes (e.g. SPSSX 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 programme which introduces the user to the basic concepts underlying the techniques. Students use and interpret statistical programmes with data sets from such business areas as marketing, finance, and organizational behaviour.

FORMAT: Seminar

PREREQUISITE: BUSI 5503.03

CROSS-LISTING: COMM 4538.03

### **BUSI 6507.03: Advanced Operations Research Project.**

This is a project class, which carries a half credit. Projects are drawn from real life, and students suggest their own topics for approval by faculty members in the M&IS area. See the area group coordinator for requirements.

FORMAT: Tutorial

PREREQUISITE: See the Management and Information Science area coordinator for requirements

### **BUSI 6512.03: Telecommunication and Business Strategy.**

This is not a class on products, services, and high technology; it is a class on strategy and the use of technology. The focus will be on how to manage and apply the rapidly changing technologies of computers and communications.

Guest lecturers are chosen to bring experts in key fields into the class and thereby expose students to the latest in these specific areas. Group projects, presentations, and individual reports are utilized to help students put their thoughts into action.

FORMAT: Seminar

PREREQUISITE: BUSI 5511.03

EXCLUSION: BUSI 6905.03 in 1992/93 and 1993/94

### **BUSI 6514.03: Systems Analysis and Design.**

The major objective of this class is to enable students to understand, design, and develop small-scale computing systems within business organizations. Students will analyze existing business systems and redesign them for computer applications. Students must have completed Managing Information Systems (5511) and be familiar with computing hardware, software, and management terminology and concepts.

FORMAT: Seminar

PREREQUISITE: BUSI 5511.03

EXCLUSION: BUSI 6904.03 (former number)

CROSS-LISTING: LIBS 5580.03

### **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. Hands-on experience with both micro-based and mainframe database management systems will be acquired.

FORMAT: Lecture/seminar

PREREQUISITE: BUSI 5511.03

EXCLUSION: BUSI 6906.03 (former number)

CROSS-LISTING: LIBS 5540.03

### **BUSI 6517.03: Management of the Information Resource.**

Information systems development should be co-ordinated to meet the information needs of the organization. There are problems of interacting with and relating to the organizational functions for which information systems provide support.

There are a number of alternative ways an information system may be structured; the selection among the alternatives is based primarily on matching the information system organization to the over-all organization. In addition to these issues, regarding the relationship to the utilizing organization, there are issues of internal management for effectiveness and efficiency.

The class is designed as a capstone; it ties together concepts provided in other classes. The information needs of various organizational functions are integrated with information systems through the master development plan.

Administration and policy considerations are applied to specific areas of information systems management.

FORMAT: Seminar

PREREQUISITE: BUSI 5511.03 and one other information systems class at the 6000-level

EXCLUSION: BUSI 6907.03 (former number)

### **\*BUSI 6518.03: Expert Systems.**

This class covers the normative view of decision making, the artificial intelligence techniques in capturing knowledge from experts, the development tools and skills for decision support systems and expert systems, and the testing and evaluation of the developed system. Particular applications in the areas of accounting, marketing, and finance will be examined.

FORMAT: Lecture/seminar

PREREQUISITE: BUSI 5511.03

EXCLUSION: BUSI 6908.03 (former number)

### **BUSI 6519.03: Systems Analysis and Applications Development.**

This class is designed to provide students with a basic understanding of system analysis and an overview of application development.

Students will be involved in the development of database using various software applications, primarily Access and Visual Basic. In addition, students will develop, document, and deliver an application to an outside end-user. This practical experience will enable students to understand and gain valuable experience in systems analysis and application development process.

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. 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: ECMM 6020.03

### **BUSI 6521.03: Supporting Teamwork Through Information Technology.**

Meetings are a way of life in every organization. In this class, theory and practice are blended to give students a practical approach to teamwork support. Topics explored include facilitation, electronic meeting systems, collaboration technologies, Group Support Systems research, cognition and decision making behaviour, group dynamics and, group communication theory.

### **BUSI 6522.03: Knowledge Discovery & Data Mining.**

From various automated sources -- such as bar-code scanners, credit card readers, usage recording devices, and most recently the internet -- today's organizations receive volumes of data, which defy methods of manual summary and analysis. Thus, a major challenge facing organizations is how to convert their expanding data stores into useful knowledge. Over the last 10 years research in statistics, machine learning, and database theory has resulted in automated methods of "mining" for "nuggets" of knowledge from data. 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 will cover the KDD process and the theory and practical application of data mining technologies such as artificial neural networks, inductive decision trees, and deductive modelling software to real-world problems of business and industry. We will also discuss some broader issues of Knowledge Management and what is required to have organizations move into a "true" information age. A project will be used to develop the students' familiarity with the database and data mining tools and the management process and practices.

### **BUSI 6523.03: Information Technology 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: ECMM 6022.06

## **Marketing and Transportation**

### **BUSI 5402.03: Buyer Behaviour.**

Designed to emphasize the "marketing concept", this class is basically an overview of the literature in consumer/industrial buyer segmentation and consumer/industrial buyer behaviour models. The objectives are: (a) to allow the student an in-depth understanding of the concept of market segmentation, target marketing, or market positioning; (b) to provide the student with a framework or model of buyer behaviour in terms of "product" choice, "product class" choice, and consumption decisions; and (c) to develop in the student a basic skill in analyzing marketing decision making with buyer behaviour constructs. The method of instruction will be lecture, discussion, and case materials.  
FORMAT: Lecture  
CROSS-LISTING: COMM 3401.03

### **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. Research designs, sampling procedures, and questionnaire designs are discussed. Each student is required to develop and execute a research project. The class uses readings, lectures, and case studies.  
FORMAT: Seminar  
PREREQUISITES: BUSI 5402.03, BUSI 5401.03  
RECOMMENDED: BUSI 6504.03, strongly recommended

### **BUSI 6402.03: Marketing Channels.**

Marketers have devoted a good deal of attention to the institutions involved in the flow of goods from the producer to the marketplace. Since most manufacturers' products pass through the hands of distribution intermediaries, an understanding of channel processes is of some importance. The channel is viewed as a system-made up of separate but interdependent members whose relationships can be at the same time cooperative and conflicting. Instruction is through lectures/discussions, case analysis, and research papers.  
FORMAT: Lecture  
PREREQUISITE: BUSI 5401.03  
RECOMMENDED: BUSI 5402.03

### **BUSI 6403.03: Advertising Management.**

Designed to improve analytic skills and decision-making capabilities through the practical application of advertising concepts and principles, the class considers market positioning, the psychology of mass communication, copy strategy, media selection, budgeting, and advertising research. The major learning activities are case analysis, class discussion, and an advertising project. The emphasis is on integrating and organizing the concepts, principles, and theories into an evaluative framework for the analysis of advertising strategy. A major resource for the class is the use of case analysis to apply the theories and propositions.  
FORMAT: Lecture/seminar  
PREREQUISITE: BUSI 5401.03  
RECOMMENDED: BUSI 5402.03

### **BUSI 6405.03: Sales Management.**

Sales Management is designed to provide students with an understanding of the tasks and problems facing today's sales manager and to familiarize them with current sales force management practice. Specifically, this class will provide an exposure to the concepts, techniques, and procedures in buyer-seller relations, salesmanship, organization of the sales force, personnel management, selection, sales training, motivation, compensation, evaluation and supervision, budgets, quotas, territories, and sales control. Extensive use of the case method and classroom discussion will be made to extend the basis text material and examine other points of view.  
FORMAT: Lecture/case studies  
PREREQUISITE: BUSI 5401.03  
CROSS-LISTING: COMM 3409.03

### **BUSI 6406.03: Domestic Transportation.**

This class examines the development of the transportation modes and national transportation policy in Canada. The characteristics and cost structures of the various modes (air, motor, pipeline, rail and water) and the effect of such costs on the carriers' pricing decisions are studied. Topics include the National Transportation Act and other governmental legislation, the evolution of the agencies of control, structure of the transport industry, regulation versus deregulation, passenger policy, urban transportation, transportation and environmental issues, current issues, and future directions. Particular attention is paid to transportation development, problems, and opportunities in the Atlantic region.  
FORMAT: Lecture/seminar  
CROSS-LISTING: COMM 3408.03

### **BUSI 6407.03: Logistics Management.**

This class is an introduction to the decision problems faced by the manager of a logistics system: to achieve the coordination of purchasing and materials management, the channels of distribution, the transportation and storage of products, and the communications and data processing system, in order to minimize the total cost of these activities and satisfy the marketing requirements of the firm. Topics include customer services, order processing, purchasing, transportation, packaging, inventory management, distribution centres, logistics organization and systems controls, and reverse distribution and recycling.  
FORMAT: Lecture/seminar  
PREREQUISITE: BUSI 5551.03 or permission of the instructor  
CROSS-LISTING: COMM 3407.03

**BUSI 6408.03: Transportation and Management.**

This class deals with a comparative review of the technical and commercial characteristics of each mode of transport, and an examination of the management components and skills that are needed for the operation of transportation enterprises. Guest speakers from the industry will be invited. Students will be expected to participate in class discussions, and a term paper on an agreed topic will be required.

**BUSI 6415.03: Marketing Technology Products.**

This class is designed to expose students to the issues, problems and challenges of creating new commercially viable products. It also provides the students with the opportunity, within the framework of a formal class, to explore the working of multi-disciplinary product development teams and to develop a complete marketing strategy for these new products.

**BUSI 6420.03: Marketing Informatics.**

Technological developments in database storage and mining, the development of relationship marketing, the rise of direct marketing and introduction of new media such as the internet have revolutionized the way marketing is conceptualized and executed. This revolution in marketing requires marketers who have a whole new set of skills and knowledge focused in the application of technology and associated practices. These skills are required for growth areas of marketing practice such as direct marketing, where demand for marketing graduates grew 40% in 1996. 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 behaviour, identify relevant segments, and develop effective strategies using all of today's new media and channels.

**BUSI 6450.03: Marketing Strategy Seminar.**

This class is the capstone class in marketing. As such, it is designed to draw together the individual marketing classes offered in the MBA programme. 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 analysis will form an important part of the class.

FORMAT: Seminar

PREREQUISITES: BUSI 5401.03 and at least two 6000-level marketing classes, (which may be taken concurrently) or permission of the instructor

**BUSI 6803.03: International Transportation.**

(See International Business Electives)

**BUSI 6806: International Marketing.**

(See International Business Electives)

**Other Electives****\*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 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.

PREREQUISITES: BUSI 5103.03, 5201.03, 5401.03

CROSS-LISTING: ECMM 6024.03

**\*BUSI 6003.03: Management of Diversification.**

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.

PREREQUISITES: BUSI 5103.03, 5201.03, 5315.03, 5401.03, 5503.03, 5551.03, or permission of the instructor

**\*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. Specific topics examined include: the decision to join a family firm, establishing credibility as a son or daughter, succession in the family firm, retaining key non-family employees, strategic planning in family firms, and other issues especially relevant for family firms. The class has two main purposes. First, it provides an organized framework for students to understand the dynamics and special issues of family firms. Second, it is designed to allow students to explore their interest in joining a family firm. Therefore, it is especially intended for students who come from families which are in business or for students considering joining a family business. Others who wish to explore a key segment of Canadian business are also welcome.

PREREQUISITES: BUSI 5103.03, 5201.03, 5305.03, 5401.03, 5503.03, 5551.03, or permission of the instructor

CROSS-LISTING: COMM 3308.03

**BUSI 6902.03: 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.

**BUSI 6951.03/6952.03: Research Reading and Conference Course.**

Provides an opportunity for supervised study on a topic of special interest to the student (proposed by the student and the faculty member involved, and approved by the Curriculum Committee).

**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 programme.

PREREQUISITE: Successful completion of first year core classes.

**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, and Environmental Studies. This adds a total of 70 classes to the regular elective choice of MBA students at Dalhousie University. As well, it encourages cross-functioning between disciplines.

# Chemical Engineering

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Location: "F" Building  
Telephone: 902-494-3953  
Fax: 902-420-7639  
E-mail: ChemEng@is.dal.ca

## Department Head

Gupta, Y.P., BSc (BHU), MEng (TUNS), PhD (Calgary), PEng.  
Process control and optimization.

## Professor Emeriti

Chen, B.H., BSc (Nat. Taiwan), MEng, PhD (McGill), PEng  
Foran, M.R., BSc (Sask), PhD (McGill), DEng (TUNS), FCIC, PEng  
McMillan, A.F., BSc, MSc (Queens), PhD (MIT), PEng

## Professors

Al Taweel, A.M., BSc (Alexandria), MSc, PhD (Colorado), PEng.  
Mixing and separation, multi-phase processing pollution prevention.  
Amyotte, P.R., BEng (RMC), MSc (Eng) (Queens), PhD (TUNS),  
PEng. Industrial safety and loss management, dust explosions.  
Fels, M., BEng, MEng (McGill), PhD (Waterloo), PEng. Air and  
water pollution control, solar energy.  
Pegg, M.J., BSc (Hons), PhD (Leeds), PEng. Combustion, safety and  
loss prevention.

## Associate Professor

Kuzak, S., BEng, MEng (McGill), PhD (TUNS), PEng. Composites,  
polymer toughening.

## Adjunct Professors

Gomaa, H., BSc, MSc (Alexandria), PhD (UNB)  
MacKnight, S.D., BSc, MSc, PhD (Dal)  
Mintz, K.J., BSc, MSc (UBC), PhD (Toronto)  
Thibault, P., BEng (Hon), PhD (McGill)

## I. Introduction

The Chemical Engineering programme 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 programme can be obtained from the Department.

## II. Classes Offered

### 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.

### 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 programme 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.

PREREQUISITES: Graduate students in Faculty of Engineering  
EXCLUSIONS: 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 6735.03: Coal Processing and Utilization.**

Topics to be discussed in this class are origin, formation and distribution of coal. Composition, classification and the most important physical and chemical properties of coal. Behaviour at elevated temperature and action of solvents. Technical and economical analysis of coal beneficiation processes with a special emphasis on the use of computer simulation programmes (USBM). Combustion, carbonization, gasification and liquefaction of coal. Environmental aspects of coal utilization.

**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.

**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

PRE-REQUISITES: 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 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.

**CHEE 7739.00: Graduate Research Seminar II.**

Graduate Students are required to participate in either this class or CHEE 6739.00 every term and make presentation based on their research projects. Additional lectures will be given by faculty and by outside speakers.

**CHEE 9000.00: Master's Thesis.****CHEE 9530.00: PhD Thesis.**

# Chemistry

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## Chairperson of Department

Boyd, R.J.

## Graduate Coordinator

Cozens, F.L.

## Professors Emeriti

Knop, O., DSc (Laval), FCIC. Structural and solid-state inorganic chemistry

Ryan, D.E., BSc (UNB), MA (Toronto), PhD, DSc (London), DIC, FCIC.

## Professors

Boyd, R.J., BSc (UBC), PhD (McGill), FCIC. Faculty of Science Killam Professor of Chemistry. Quantum chemistry; reaction mechanisms; density functional theory and surface chemistry

Burford, N., BSc (Wales, Cardiff), PhD (Calgary). Faculty of Science Killam Professor of Chemistry. Synthesis and comprehensive characterization of main group compounds

Cameron, T.S., BA, MA, DPhil (Oxon). X-ray structural studies on inorganic compounds

Chatt, A., BSc (Calcutta), MSc (Roorkee), MSc (Wat), PhD (Toronto), FCIC. Nuclear and bioanalytical methods; trace elements in the environment.

Coxon, J.A., MA (Cantab.), MSc, PhD (East Anglia). Electronic spectra; laser spectroscopy; chemiluminescence

Dahn, J.R., BSc (Dal), MSc, PhD (UBC), NSERC/3M Canada Inc. Industrial Research Chair, cross-appointment with Physics. Materials for advanced batteries

Grindley, T.B., BSc, MSc, PhD (Queen's), FCIC. Carbohydrate chemistry; molecular modeling, synthesis

Grossert, J.S., BSc, MSc, PhD (Natal), FCIC. Mass spectrometry and organosulphur chemistry.

Kwak, J.C.T., BSc, MSc, PhD (Amsterdam), FCIC. Colloid and polymer chemistry.

Pacey, P.D., BSc (McGill), PhD (Toronto), FCIC. Temperature dependence of reaction rates

Pincock, J.A., BSc, MSc (Man), PhD (Toronto), FCIC. Studies on reaction mechanisms involving both ground and excited states

Ramaley, L., BA (Columbia), MA, PhD (Princeton), FCIC. Mass spectrometry and chemical instrumentation

White, M.A., BSc (Western), PhD (McMaster), FCIC. Killam Research Professor of Materials Science. Material science, thermal properties of solids

## 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

Hooper, D.L., BSc, MSc, PhD (UNB), FCIC. Spectroscopic methods; high field multinuclear NMR

Kusalik, P.G., BSc (Lethbridge), MSc, PhD (UBC). Computer simulation of liquids and solids

Warren, C.H., BSc (Western), PhD (McMaster). Molecular graphics, theoretical chemistry

Wentzell, P.D., BSc (Dal), PhD (Mich State). Chemometrics; sensors; continuous flow analysis

White, R.L., BSc (Dal), PhD (McMaster), FCIC. Biosynthesis of natural products and enzymes of secondary metabolism

## Assistant Professors

Schepp, N.P., BSc, PhD (Toronto). Biologically important reactive intermediates, nanosecond laser flash photolysis

## Adjunct Professors

Aquino, M.A.S., BA, BSc (Queen's), MSc (Queen's), PhD (Carleton). St. Francis Xavier University, Antigonish, NS. Coordination Chemistry.

Boyd, R.K., BSc, PhD (St. Andrews, Scotland), FCIC. National Research Council, Institute For Marine Biosciences, Halifax, NS. Separations science; mass spectrometry.

Hellou, J., BSc (Montreal), MSc, PhD (UBC), Bedford Institute of Oceanography, Dartmouth, NS. Organic marine environmental chemistry.

Kiceniuk, J., BSc (Alberta), MSc, PhD (UBC). Dept. of Fisheries and Oceans, St. John's, NF. Environmental chemistry and toxicology

Lamoureux, M., BSc (Ottawa), PhD (Carleton), St. Mary's University, Halifax, NS. Environmental and analytical chemistry

Marangoni, D.G., BSc (Acadia), PhD (Dal), St. Francis Xavier University, Antigonish, NS. Surfactant technology.

Roscoe, J.M., BSc, MSc (Acadia), PhD (McGill). Acadia University, Wolfville, NS. Gas phase kinetics and spectroscopy.

Singer, R.D., BSc (SMU), PhD (Simon Fraser). St. Mary's University, Halifax, NS. Metals in organic chemistry

## Session Lecturers

Adams, K.A.H., BSc (Manitoba), MSc (McMaster), PhD (Sask)

Robertson, K.N., BSc, MSc (Dal)

## Visiting Scientists (200)

Al-Somel, N., Atomic Energy Commission of Syria, Damascus, Syria

Fukushima, M., Ishinomaki Senshu University, Ishinomaki, Miyagi, Japan

Kada, R., Research Centre at Draria, Algiers, Algeria

## Postdoctoral Fellows, Research Associates/Assistants (2000)

Acharya, R., PhD (U of Mumbai, India)

Beasy, M., BSc (Dal), MSc (Waterloo)

Bottaro, C., BSc (SMU), PhD (Dal)

Chan, M., BSc (Calgary), PhD (Dal)

Cordes, R.E., BSc (Dal), MSc (UBC)

Douma, M., BSc (Dal)

Furue, H., BSc, MSc (Osaka), PhD (Queen's)

Gauld, J., BSc (Queensland, Australia), PhD (Australian National University)

Hu, Z., BSc (Central China Normal University), MSc (Wuhan), PhD (Kyoto)

Indrasena, W., MSc, PhD (DalTech)

LeBlanc, D.J., BSc (St FX), PhD (McMaster)

Li, Y., PhD (U of Salford, UK)

MacKay, J., BSc (Acadia), MSc, PhD (Dal)

Pincock, A.L., BSc, MSc (Manitoba) BFA (NSCAD)

Roesler, R., MSc (Babes-Bolyai University, Romania), PhD (Bremen, Germany)

Schreyer, S., PhD (Waterloo)

Stefanova, R.S., BSc (HP Inst., Shumen, Bulgaria)

Zhan, B.-Z., PhD (Hong Kong University of Science and Technology)

Programmes 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. Normally, a MSc Degree may be required as a prerequisite for entry into a PhD programme. 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).

### A. 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.

All graduate students must be in the Department and available for teaching assistant duties by September 1st of each year.

Further details of degree regulations are presented in a Handbook for Graduate Students in Chemistry, which may be obtained from the Departmental Office.

## II. Degree Options

### A. MSc Degree

#### Full-time Programme

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 a 1-year MSc candidate to graduate after 12 months of resident study. Experience has shown that most MSc candidates in the Department require at least 16 months to complete their work. Financial support is not available for more than two years.

#### Part-time Programme

The full-time MSc class requirements and thesis regulation apply. The thesis must be supervised by a member of the Department. No stipends are available from the Faculty of Graduate Studies.

### B. PhD Degree Programme

Three full-credit classes, or the equivalent, and two departmental graduate student seminars, are required. A preliminary oral examination must be completed successfully. Original research, together with preparation and oral defence of a thesis, is required. For the minimum time required to complete the programme, see Section 4. Financial support is not available for more than four years.

## III. Classes Offered

Core classes, specialized classes and modular classes are offered by the department. 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 required to take such classes outside their area of specialization.

### Core Classes

The following half-credit core classes are normally offered at least every other year. Please consult the Department to ascertain which classes are being given.

### Inorganic and Structural

#### 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: Advanced Transition 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: Topics in Solid State Chemistry.

Structural methods in inorganic chemistry. Topics include: powder diffraction, the method of compound identification, reitveld analysis and the determination of structures from powders (maximum entropy method), synchrotron and neutron radiation; electron diffraction, transmission electron microscopy and X-ray fluorescence and X-ray photoelectron spectroscopy; Mossbauer spectroscopy; vibrational spectroscopy, the determination of inorganic structures by consideration of symmetry and spectra; IR, Raman and isotopic dilution methods; magnetic measurements in transition metal chemistry and the structural information provided by these measurements.

### Analytical

#### 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. This class does not present a survey of the field; rather, it focuses primarily on past (and future) innovation.

#### CHEM 5202.03: Topics in Advanced Analytical Spectroscopy.

Instrument designs for emission, absorption and fluorescence measurements are described and their sensitivity and signal-to-noise characteristics discussed. Additional topics include laser-based methods and optical rotation.

### Physical and Theoretical

#### 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 of modern techniques is also given.

#### **Organic**

### **CHEM 5401.03: Synthesis in Organic Chemistry.**

This class is designed to allow the student to understand the modern synthetic organic literature. 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.

### **CHEM 5402.03: Organic Structure Determination.**

This class reviews and considerably extends the work in organic structure determination which is usually taught in the third or fourth year of undergraduate study as the first formal class in structure determination. Topics are chosen in infrared, mass and NMR spectroscopy, however, more than half the lectures deal with the theory and application of nuclear magnetic resonance. The description, in English, of spectra and of the process by which spectra are interpreted to give a particular molecular structure, is demonstrated and then given an important place in the marking of assignments and tests.

### **CHEM 5403.03: Organic Reaction Mechanisms.**

The fundamental concepts of bonding, structure, and dynamic behaviours of organic compounds are discussed. Methods for determining the mechanisms of organic reactions are discussed. Topics considered 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.

#### **Interdisciplinary**

### **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.

#### **Specialized Classes**

Additional specialized classes at the 6000 level provide the opportunity for in-depth study of selected topics which are more closely related to the student's research area. These classes vary from year to year depending on students' needs and interests.

#### **Inorganic**

### **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: CHEM5504.

### **CHEM 6199.03: Special Topics in Inorganic Chemistry.**

#### **Analytical**

### **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, fresh water 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 statistics, 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.

#### **Physical/Theoretical**

### **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 6315.03: Topics in Statistical Mechanics.**

Applications of modern statistical mechanics are examined. The topics covered may include nonequilibrium systems, dynamics, modern methods (including computer simulation) and their practical application. Students will be expected to have a working knowledge of the principles of statistical mechanics.

### **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.

#### **Organic**

### **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 6405.03: Stereochemistry.**

This class covers principles of symmetry, conformational analysis, stereoisomerism, separation and configuration of stereoisomers, and stereoelectronic effects in organic reactions. Most material is taken from E. Juaristi's text, "An Introduction to Stereochemistry and Conformational Analysis", in conjunction with a reading list of other texts. Each student reviews critically at least one paper from the research literature.

### **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.**

#### **Interdisciplinary**

### **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: Mass Spectrometry.**

The first third of the class reviews a range of modern mass spectrometers and includes a discussion of their physics, electronics and uses in analytical chemistry. The next portion of the class examines fundamental theories of the structures and reactions of ions in the gas phase. The final third of the class reviews fragments of organic ions, generated by electron impact and chemical ionization methods. Students are evaluated by their performance in two term tests, a formal presentation to the class and a final examination. PREREQUISITES: CHEM 5402.03 or equivalent, or ability to demonstrate an adequate knowledge of mass spectrometry to the class professors

#### **Modular**

### **CHEM 6600.03: Special Topics in Chemistry.**

This class introduces students to a variety of advanced topics in chemistry, viz. digital electronics, molecular mechanics, NMR instrumentation, X-ray crystallography, and/or mass spectral instrumentation. These are skills needed by the modern chemist, and this class introduces the student to various practical aspects.

This class is taught in a variety of sections ("modules"), each comprising a small section of a subject, emphasizing theory and especially practical aspects, aimed at the practitioner. The topics covered are chosen from the following:

- digital electronics (normally 15 lecture/lab hours)
- molecular mechanics (normally 15 lecture/lab hours)
- routine NMR methods (normally 15 lecture/lab hours)
- X-ray crystallography (normally 15 lecture/lab hours)
- mass spectral instrumentation (normally 15 lecture/lab hours)

with 45 lecture/lab hours (i.e. 3 of above modules) constituting one half class credit. New topics may be added in future years. Normally more than 3 modules will be offered in each academic year. All modules must be taken within a given academic year (September to April) in order that a grade be submitted at the end of the year.

Each module has a test or examination taken under controlled conditions, and this is used to comprise the major portion (50%) of the assessment for that module. Other portions of the assessment is on quizzes, assignments, seminars and other presentations and/or lab work. The numerical marks from each of the modules comprising the class is averaged and converted to a letter grade by a class coordinator, normally a member of the Graduate Studies Committee. This person signs the grade sheet submitted to the Registrar, and the following scale is used for conversion:

A+>89, A>84, A->79, B+>74, B>69, B->64, FM>60, F<59 % .

PREREQUISITES: Any graduate student in the Department of Chemistry can take this class; there are no specific prerequisites. Students from other Departments can take this class with the permission of their supervisory committee and the class coordinator.

#### **Module Descriptions**

##### **Digital Electronics**

This module introduces the basics and practical application of digital electronics. Topics may include: analog-to-digital conversion; digital-to-analog conversion; personal computer architecture and BUS structure; serial and parallel ports.

INSTRUCTOR: L. Ramaley

EXCLUSION: CHEM 6501.03

### **Molecular Mechanics**

This module teaches students how to use some of the popular molecular mechanics modelling packages, HYPERCHEM, PCMODEL, MM3 and CHEMX. It emphasizes hands-on applications using a variety of computers and models reference compounds as well as some of interest to a student's research.  
INSTRUCTORS: T.S. Cameron and/or T.B. Grindley

### **Routine NMR Methods**

This module introduces routine NMR methods, operating the spectrometer under manual control, measuring known compounds. The units offered are: (a) the EM360 spectrometer, (b) spin decoupling with the EM360, (c) automated H-1 spectroscopy on AC250F, COSY, (d) automated C-13 spectroscopy HETCOR (e) manual spectroscopy, (f) T1 and nOesy (g) offline processing (h) an unknown compound. Students normally do units 3-8. Those with no practical NMR experience do all units.  
INSTRUCTOR: D.L. Hooper  
EXCLUSION: CHEM 4402.03

### **X-ray Crystallography**

This module introduces the technique of X-ray crystallography, both the theory and practical work. A crystal structure is solved.  
INSTRUCTOR: T.S. Cameron  
EXCLUSION: CHEM 4504.03 and CHEM 5504.03

### **Mass Spectral Instrumentation**

This module introduces the practical side of mass spectrometry.  
INSTRUCTORS: R.K. Boyd and/or J.S. Grossert and/or L. Ramaley

### **CHEM 8891.00: Co-op Work Term I.**

PREREQUISITES: CHEM 2101.03, 2201.03, 2401.03, 2402..03, CSCI 1200.03, SCIE 2800.00 or equivalent, STAT 1060.03 or 2060.03, and permission of Coordinator.

### **CHEM 8892.00: Co-op Work Term II.**

PREREQUISITES: CHEM 8891.00.

### **CHEM 8893.00: Co-op Work Term III.**

PREREQUISITES: CHEM 8892.00.

### **CHEM 8894.00: Co-op Work Term IV.**

PREREQUISITES: CHEM 8893.00.

# Civil Engineering

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Telephone: 902-494-3960  
Fax: 902-494-3108  
E-mail: civil.engineering@dal.ca  
Website: www.dal.ca/daltech/civil

## Department Head

Taheri, F., BEng, MAsC, PhD (TUNS), PEng. Advanced composite materials, finite element methods (elastic, plastic), fracture mechanics and fatigue.

## Professors Emeritus

Meyerhof, G.G., BSc, MSc, PhD, DSc (London), CM, IngDrhc (Aachen), DSchc (Ghent), DEng (TUNS), DSchc (McMaster and Queens), LLDhc (C'dia), PEng  
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. Flexible pavement, highways, pavement design and performance, transportation.  
Baikie, L.D., BEng, MEng, PhD (TUNS), PEng. Buried flexible structures, foundations, geotechnical engineering.  
Islam, M.R., Dip. Ing. (Algeria), MSc (Alberta), PhD (Alberta). Killam Chair in Oil and Gas.  
Satish, M. G., BSc, BE CivEng (My.), MEng, PhD (Concordia), PEng. Water resources engineering, numerical modeling of flows, system optimization, open channel flow.  
Vaziri, H.H., BSc, MSc DIC (London), PhD (UBC), PEng. Numerical modelling of geotechnical and reservoir engineering problems, soil and rock testing.

## Research Professor

Mufti, A.A., BEng (Karachi), MEng, PhD (McGill), PEng. Fibre reinforced plastic, fibre reinforced concrete, innovative structures, intelligent sensing steel free deck, structures systems.  
Waller, D.H., BEng (TUNS), DIC (London), PhD (Dal), PEng, Director, Centre for Water Resources Studies

## Associate Professors

Hansen, D., BScE (Guelph), MScE (UNB), PhD (Ottawa), PEng. Hydrology, river hydraulics, flow through porous media, municipal water systems.  
Taheri, F., BEng, MAsC, PhD (TUNS), PEng, Department Head  
Trottier, J.F., BScA, PhD (Laval), PEng, Director, Nova Scotia CAD/CAM Centre. High performance concrete, durability of civil engineering structures, nondestructive testing (ground penetrating radar).

## Assistant Professors

Gagnon, G.A., BScE (Guelph), PhD (Waterloo), PEng, Graduate Studies Coordinator  
Thornburn, J., BSc (UNB), MSc (Alberta), PhD (Dal), PEng, Undergraduate Studies Coordinator

## Adjunct Professors

Akhavi, MS, BSc, MSc (Colorado), PhD (Iowa)  
Bakht, B., BSc (Aligarh), MSc, PhD (London), PEng  
Gilkie, R.C., BSc (Dal), BEng, MEng (TUNS), PhD (London), PEng  
Sastry, V.V.R.N., BE (Osmania), ME (IIS Bangalore), PhD (TUNS), PEng

## Adjunct Associate Professors

Cross, H.S., BA (Queens), MSc (Dal)  
Hart, W.C., BSc (Ohio Wesleyan), MA (Indiana), PhD (Dal)  
Li, J., BSc, MAsC (Windsor), PhD (Toronto), PEng  
Pegg, N., BSc (Guelph), MAsC (UBC), PhD (TUNS), PEng

## Adjunct Assistant Professors

Al-Khateeb, B., BSc, MSc (Iraq), PhD (Birmingham, UK)  
Jalali, S.J., BSc, MScE (Tehran), PhD (Dal)  
Newhook, J.P., BEng, MAsC, PhD (TUNS), PEng  
Oguejiofor, E.C., MSc, PhD (U of Sask)  
Salah, M., BSc (Libya), MAsC, PhD (TUNS), PEng

## 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 and water power developments. See the Engineering section for details of Master's and Doctoral programmes.

## II. Classes Offered

### 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 Civil Engineering Department. This class is normally available to a Graduate Student enrolled in a Master's Degree Programme.

### 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 anisotropic elastic continuum concludes the class.  
PREREQUISITES: 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 Civil Engineering will be required to take this class and offer their findings, orally in one 30-minute presentation to the faculty members of the department and students, six months prior to the completion of their program. This presentation will be followed by a question and answer session. Graduate students will also submit a written version of their presentations (or a hard-copy of their presentation slides) to the Graduate Coordinator of their department.

NOTE: This is a required class for all civil engineering students.

**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.**

The class includes a review of methods and procedures for subsoil investigations for foundations of structures, and a review of the strength and deformation characteristics of soils. The bearing capacity and settlement of shallow foundation is discussed with both the working stress method and the method of partial factors of safety being considered. Other design considerations for shallow foundations are discussed.

**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 behaviour and its mathematical representation. The aspects considered include nonlinear elastic and elasto-plastic behaviour 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 contraminant 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.

PREREQUISITES: CIVL 6141.03

**CIVL 6144.03: Geotechnical Aspects of Waste Management.**

This class deals with the assessment and remediation of hazardous waste sites. The topics covered include an introduction to remediation of hazardous waste sites, purpose and execution of field investigations, regulations governing solid waste disposal, analysis of hydrogeological conditions and groundwater models, site selection and characterization, feasibility study for selecting remedial alternatives, site-closure, related activities, insitu treatment of contaminated groundwater and soils, design of covers and landfills, and case studies.

**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 programmes 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.

PREREQUISITES: 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: Behaviour and Design of Steel Structures.**

Advanced concepts of the behaviour 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 behaviour.

PREREQUISITES: CIVL 1457.03 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, behaviour under tensile, flexure, fatigue and impact loading, properties of freshly mixed and hardened fibre reinforced concrete are studied. Special fibre reinforced cementitious 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.

PREREQUISITES: CIVL 1050.03, CIVL 1451.03

**CIVL 6159.03: River Engineering.**

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.

PREREQUISITES: 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.

PREREQUISITES: CIVL 1035.03 or CIVL 1041.03

### **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 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 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 Ph.D. 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.

PREREQUISITES: 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 thesis. All graduate students pursuing a PhD degree in Civil Engineering will be required to take this class and offer their findings, orally, in two 30-minute presentations to the faculty members of the department and students, in two intervals, before their thesis defence. This presentation will be followed by a question and answer session. Graduate students will also submit a written version of their presentations (or a hard-copy of their presentation slides) to the Graduate Coordinator of their department.

NOTE: This is a required class for all civil engineering students.

### **CIVL 9000.00: Masters Thesis.**

### **CIVL 9530.00: PhD Thesis.**

# Classics

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Location: 6135 University Avenue  
Halifax, NS B3H 4P9  
Telephone: (902) 494-3468  
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Website: <http://www.dal.ca/~claswww/claswww.html>

## Chairperson of Department

House, D.K.

## Professors Emeriti

Crouse, R.D., BA (Vind), STB (Harvard), MTh (Trinity), PhD (Harvard)  
Doull, J.A., BA (Dal), MA (Toronto)

## Professors

Friedrich, R., Dr phil (Goettingen), McLeod Professor of Classics  
Hankey, W.J., BA (Vind), MA (Toronto), PhD (Oxon), Graduate Studies Coordinator  
Scully, S., BA, MLitt (Bristol), PhD (Toronto)  
Starnes, C.J., BA (Bishop's), STB (Harvard), MA (McGill), PhD (Dal)

## Associate Professors

House, D.K., MA (Dal), PhD (Liverpool)

## Assistant Professor

Calkin, P., BA (UBC), MA, PhD (Dal)  
Greatrex, G.B., BA, MA, DPhil (Oxon)

The Department invites all 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 programme might appeal to students who wish to study the relation of contemporary culture to its classical origins.

MA students may concentrate their work in any of these areas. 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. 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 programmes, a knowledge of other ancient languages may be required.

## II. Degree Options

### 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, and 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 and Philosophy. Before submitting a thesis, the candidate must pass a comprehensive examination (written and oral) in his/her special field: this will normally be taken towards the end of the second or beginning of the third year of study.

## III. Classes Offered

### *Greek and Latin Literature*

CLAS 5010.06: Seminar on Greek Literature (1).  
CLAS 5020.06: Seminar on Greek Literature (2).  
CLAS 5021.03: Reading and Research in Greek Literature (1).  
CLAS 5022.03: Reading and Research in Greek Literature (2).  
CLAS 5030.06: Seminar on Latin Literature (1). P. O'Brien  
CLAS 5040.06: Seminar on Latin Literature (2). P. O'Brien  
CLAS 5041.03: Reading and Research in Latin Literature (1).  
CLAS 5042.03: Reading and Research in Latin Literature (2).

### *Ancient History*

CLAS 5530.06: Reading and Research in Ancient History (1).  
CLAS 5531.03: Reading and Research in Ancient History (2).  
CLAS 5535X/Y.06: Rome and the East. G. Greatrex  
CLAS 5550.06: Reading and Research in Ancient History (2).  
CLAS 5551.03: Reading and Research in Ancient History.  
CLAS 5552.03: Reading and Research in Ancient History.

### *Classical Philosophy*

CLAS 5600.06: Seminar on the Philosophy of Aristotle.  
CLAS 5601.06: Seminar on Plato and Neoplatonism. W.J. Hankey  
CLAS 5602.06: Seminar on Hellenistic Philosophy. D.K. House  
CLAS 5603.06: Seminar on the Philosophy of Plato. D.K. House

### *Patristics*

CLAS 5700.06: Seminar on the Philosophy of the Church Fathers. W.J. Hankey  
CLAS 5701.06: Seminar on the Medieval Interpreters of Aristotle. W.J. Hankey  
CLAS 5705.06: Seminar on St. Augustine (1). C.J. Starnes  
CLAS 5706.06: Seminar on St. Augustine (2). C.J. Starnes  
CLAS 5800.06: Seminar on Christian Beginnings. W.J. Hankey  
CLAS 5801.06: Seminar on Christianity and Neoplatonism. W.J. Hankey

## Classes Occasionally Offered

### *Greek and Latin Literature*

CLAS 5011.06: Seminar on Greek Tragedy.  
CLAS 5012.06: Seminar on Greek Comedy.  
CLAS 5013.06: Seminar on Greek Lyric.  
CLAS 5031.06: Seminar on Roman Satire.  
CLAS 5032.06: Seminar on Roman Historians.  
CLAS 5033.06: Advanced Seminar on Latin Literature.  
CLAS 5034.06: Seminar on Greek Literature.

### *Ancient History*

CLAS 5531: Seminar on the Roman Empire and the Rise of Christianity.  
CLAS 5551.03: Ancient Law and Jurisprudence.

### *Classical Philosophy*

CLAS 5604.06: History of the Interpretation of Aristotle.  
CLAS 5605.06: Advanced Seminar on Neoplatonism. W.J. Hankey  
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.

### *Patristics*

CLAS 5707.06: Readings in Patristic Texts.  
CLAS 5708.03: Reading and Research.  
CLAS 5900.06: Departmental Seminar.  
CLAS 5901.06: Reading and Research.

CLAS 9000.00: Master's Thesis  
CLAS 9530.00: Doctoral Thesis

# Community Health and Epidemiology

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Location: Clinical Research Centre  
5849 University Avenue  
Halifax, NS B3H 4H7  
Telephone: (902) 494-3860  
Fax: (902) 494-1597

## Head of Department

MacLean, David R.

## Director of Graduate Programs

Kirkland, Susan A.

## Professors Emeriti

Irwin, A.C., BA (Sask), MD, DPH (Toronto), DSM (Edin), FRSH

## Professors

Cohen, F., BA (Harvard-Radcliffe), MEd (Harvard), PhD (Minn), major appointment in Resource and Environmental Studies  
Cohen, M., BA (Mich), DMD (Tufts), MSD, PhD (Minn), MPH (Boston) major appointment in Oral and Maxillofacial Pathology  
Kutcher, S., MD (McMaster), FRCPC, major appointment in Psychiatry  
MacLean, D.R., MD (Dal), MHSc (Toronto), CCFP  
MacLean, L.C., BA, BEd (StFX), MA, PhD (Dal), major appointment in Business Administration  
Murray, T.J., OC, MD (Dal), FRCPC, MACP, major appointment in Neurology  
Padmos, M., BA (Toronto), MD (McMaster), FRCPC  
Stewart, R., BA, BSc, MD, FACEP, FRCPC, DSc (Hon), major appointment in Emergency Medicine

## Associate Professors

Flowerdew, G., BSc (London), MSc (London), DSc (Harvard)  
Joffres, M., MD (Toulouse), MSPH, PhD (Hawaii)  
Kephart, G., BS (Hons) (California), MS, PhD (Wisconsin)  
Langille, D., BSc (Acadia), MD (Dal), MHSc (UBC)  
Poulin, C., BSc (Dal), MD (Laval), MSc (McGill), FRCPC  
Sketris, I., BScPhm (Toronto), MPA (Dal), PharmD (Minnesota), major appointment in Pharmacy

## Assistant Professors

Burge, F., BA, MD (Queens), MSc (McGill), major appointment in Family Medicine  
Cox, J., BA, MD (Toronto), FRCPC, major appointment in Cardiology  
Curtis, L., BSc(Hons) (Trent), MA, PhD (McMaster)  
Dodds, L., MS (Washington), PhD (Toronto), major appointment in Obstetrics and Gynecology  
Gross, M., MSc (McMaster), MB, BS (Newcastle-upon-Tyne), FRCS (Eng), FRCPS, major appointment in Surgery  
Guernsey, J., BSc (Hons) (Carleton), MSc, PhD (Iowa)  
Johnston, G.M., BSc (McGill), MHSA (Alberta), PhD (Western), major appointment in Health Services Administration  
Kirkland, S., BSc (Joint Hons), MSc (Waterloo), PhD (Toronto)  
Kozousek, V., MD (Laval), FRCSC, MPH (Johns Hopkins), major appointment in Ophthalmology  
Langley, J.M., MD (Dal), MSc (McMaster) major appointment in Paediatrics  
LeBlanc, J., BA (Toronto), MD, MSc (McMaster), major appointment in Paediatrics

MacLean, S., BSc, BA (Hons), MA, PhD (Dal), major appointment in Political Science  
MacPherson, K., BSc, MD (Dal), MPH (Mich)  
McIntyre, L., MD, MHSc (Toronto), FRCPC, major appointments in Health Services Administration and Health and Human Performance  
Mitchell, T., BFA (NSCAD), MEd, PhD (Toronto)  
Townsend, E., PhD (Dal), MAEd (St.FX), BSc, DipP&OT (Toronto), major appointment in School of Occupational Therapy  
Veldhuyzen van Zanten, S., MD (Amsterdam), MSc (McMaster), PhD (Amsterdam), major appointment in Medicine  
Veugelers, P., MSc (Wageningen), PhD (Amsterdam)  
Weerasinghe, S., BSc (Jaffna), MSc (Colombo), PhD (Dal)

## Lecturers

Anderson, D., BA, MD (Dal), MSc (McMaster), major appointment in Medicine

## Adjunct Professors

Baikie, M., BScPhm (Toronto), MD (McMaster), MSc Epidemiology (McMaster), DTM&H (Liverpool), DOHS (McMaster), FRCPC  
Braunstein, J., BSc (Cornell), Pediatric Nurse Practitioner Certificate (Virginia), MPH (Minn)  
Brown, M.G., BA (Western), MA (Queen's), AM, PhD (Chicago)  
Davidson, K., BA(Hon) (Queen's), MAsc, PhD (Waterloo)  
Farquharson, J., BSc, MSc (Dal)  
Hicks, V., MA (Dal)  
Joffres, C., DrEd (Alberta)  
King, D., BScHC, MD (Dal)  
O'Brien, R., BA (UPEI), MSc (UBC)  
Prentice, J., MD (Dal), MPH (Johns Hopkins), DOHS (McMaster), CCBOM  
Reid, D., MD (Dal)  
Stewart, M.J., BScN (McMaster), PhD (Dal)  
Sweet, L., BSc (Acadia), MDCM (McGill), MSc (London), FRCPC  
Tan, M., MD (Dal), FRCPC, FACP  
White, F.M.M., MD, CM (McGill), MHSc (UBC)  
Zahner, G., BA (Weelesley), MA (Boston), PhD (Yale)

## I. Introduction

### A. Master of Science

The MSc Community Health and Epidemiology (CH&E) programme focuses on knowledge, analytical skills and formal evaluative methods with application to disease prevention, health promotion and assessment of community health service and system needs. The programme includes one year of class work plus thesis.

### 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. Faculty in the Department of Community Health and Epidemiology have backgrounds in a number of disciplines including community medicine, epidemiology, biostatistics, economics, occupational/environmental health, psychology, demography and sociology. Faculty in the department have provided leadership in the areas of population health research, prevention, health promotion, and assessment of community health service and system needs. The Department of Community Health and Epidemiology houses the Biostatistics Consulting Unit, the Population Health Research Unit (PHRU), Heart Health Nova Scotia and the Nova Scotia Environmental Health Centre. The Department of Community Health and Epidemiology has been designated a World Health Organization Collaborating Centre for Community Health and Epidemiology.

## II. Admission Requirements

The typical MSc CH&E student has had undergraduate training in a health profession or related discipline and has worked in the health sector. Admission standards are those of Dalhousie University's Faculty of Graduate Studies. An honours baccalaureate degree or an M.D. degree from a recognized university is ordinarily required. Enrollment is limited. A limited number of part-time students are

accepted. Applicants must meet English Language Competency and Quantitative Skills requirements. Applicants will be interviewed as part of the selection process.

### III. Curriculum

The programme requires a minimum of five Core Classes, three Elective Classes and a Thesis. All class work may be completed in one academic year. The five required classes are: Community Health Principles; Epidemiology Principles; Research Methods in Community Health & Epidemiology; Biostatistics II; and Community Health Services Systems.

The Master's Thesis is a major part of the MSc CH&E programme. 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 programme.

### IV. Classes Offered

#### 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 topics through group and individual projects.

INSTRUCTOR: J. Guernsey/D. Langille

#### CH&E 5010.03: Epidemiology Principles.

This introductory class is intended for graduate-level students with no background or formal training in epidemiology. The class explores the principles, concepts and methods employed in epidemiologic research, with examples from the literature in communicable and non-communicable diseases. The objective is to provide students with an appreciation of the principles and methods of descriptive and analytic epidemiology, including: commonly used measures of disease frequency; sources of data; crude, specific, and adjusted rates; cohort analysis of mortality; standardization; cause-effect relationships; the roles of chance, bias and confounding.

INSTRUCTOR: S. Kirkland/M. Joffres

#### CH&E 5019.03: Biostatistics I.

An introduction to statistics for medical research. The class aims to provide an understanding of the basic principles that underlie research design, data analysis and interpretation of results.

Students will become proficient in the use of SAS.

INSTRUCTORS: S. Weerasinghe/G. Flowerdew

#### CH&E 5020.03: Biostatistics II.

An intermediate level class in statistics for medical research. The class follows Biostatistics I. Students will acquire the necessary skills to carry out a wide range of statistical analyses. Both SAS and STATA computer package programs will be used.

INSTRUCTORS: S. Weerasinghe/G. Flowerdew

#### 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: P. Veugelers

#### CH&E 5040.03: Community Health Services Systems.

This class examines community health services systems and their evolution. Topics covered include: health status indices for populations and individuals; health determinants; health service needs and their assessments; systems of care; health services delivery and financing in Canada; managing public health system resources; health and social policy; and the ethics of choice in community health care systems.

INSTRUCTORS: D. Langille/D. Maclean/L. Curtis

#### CH&E Elective Classes

#### 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 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: J. Read Guernsey

CROSS-LISTING: ENVI 5010.03

#### CH&E 6010.03: Community Health Practicum.

INSTRUCTOR: S. Kirkland

#### 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, poisson regression, and survival analysis (time permitting), and the combining of individual study results using meta-analysis.

INSTRUCTOR: 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.

INSTRUCTORS: S. Weerasinghe/G. Flowerdew

#### CH&E 6022.03: Evaluation of Health Services and Programmes.

This class is designed as an applied class in the economics of health care services. The first half of the class will delve into the economic theories or models necessary to evaluate the efficiency of the market for health services and the efficient allocation of scarce resources in health and health care. Examples of possible topics to be covered are the nature of the market for health services, asymmetries of information, externalities, principal-agent relationships, insurance, and the supply and demand for health services. The second half of the class will concentrate on the economic evaluation of health services. Examples of possible topics to be covered are the efficacy,

effectiveness and efficiency of health services, measuring health outcomes, measuring costs, present value analysis, cost-effectiveness, cost-benefit, cost-utility analysis.  
INSTRUCTOR: L. Curtis

### **CH&E 6024.03: Methods in Clinical Trials.**

The 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: P. Veugelers

### **CH&E 6035.03: Medicine and Society A Course in the Medical Humanities.**

### **CH&E 6042.03: Determinants of Health in Human Populations.**

The class will focus on health from a population and societal perspective, with an emphasis on the determinants and distribution of health. 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: G. Kephart

### **CH&E 6045.03: Qualitative Methods in Health Research.**

This advanced class in community research is designed to introduce students to the philosophical underpinnings of and practical research tools within qualitative research. The class content will promote a well articulated grounding in qualitative research that acknowledges the epistemological and methodological diversity within qualitative research and examines the critical issues of subjectivity, objectivity, validity and reliability. The class will be balanced between theoretical and practical components such that students will develop a theoretically sound rationale for their proposed research and gain experience in data collection, transcription, and analysis.

INSTRUCTOR: T. Mitchell

### **CH&E 6050.03: The Political Economy of Health and Development.**

This class examines issues of health within a political economy framework. It is intended for graduate students interested in pursuing an interdisciplinary approach to the study of the relations between health and development. The first section of the class will examine broad issues of health in a comparative context, addressing differences in health status and gaps in health care within and among countries throughout the world and relating these divergences to theories of international development. The second section will focus on the present context of structural change related to globalization, and will involve in-depth examinations of policy responses by several categories of actors which are relevant to health care in contemporary political economy contexts.

INSTRUCTORS: S. MacLean, D. MacLean

### **CH&E 6060.03: Directed Readings/Studies**

### **CH&E 9000.00: Master's Thesis**

# Computer Science

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## Dean, Faculty of Computer Science

Slonim, J., BSc, MSc (Western), PhD (Kansas)

## Administrative Assistant to the Dean

Publicover, A., BSc (Dal), BA (Dal) Telephone: 902-494-1199

## Graduate Administrator

Steyer, U. Telephone 902-494-6438

## Professors

Bodorik, P., BSc (Calgary), MEng, PhD (Carleton). Databases & distributed databases, architectural support for operating systems.  
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). Centralized and distributed databases, parallel computing, analysis of algorithms.  
Grundke, E.W., BSc, MSc (Dal), PhD (Waterloo). Simulation, computer networks.  
Hitchcock, P., MA (Oxford), PhD (Warwick). Software engineering.  
Jost, A., BSc, MSc, PhD (Dal). Telecommunications, microelectronics, VLSI, computer-aided design, computer networks.  
Milios, E.E., Dipl Eng (National Technical University), SM & EE, PhD (MIT). Computer vision, mobile robotics, multiagent robotics, computational auditory scene analysis, interactive system design.  
Riordan, D., BSc, MSc (Port Elizabeth), PhD (Carleton). Intelligent computer systems.  
Shepherd, M.A., MSc, PhD (UWO). Hypertext, information retrieval, distributed information systems, electronic news.  
Slonim, J., BSc, MSc (Western), PhD (Kansas), Dean of Computer Science. Software engineering, distributed databases, electronic commerce.

## Associate Professors

Heywood, M., BEng (Plymouth), PhD (Essex). Genetic programming, neural networks, soft-computing with applications in spatial and/or temporal reasoning; reconfigurable computing.  
Rau-Chaplin, A., BSc (York), MSc, PhD (Carleton). Parallel and network computing, electronic commerce.  
Scrimger, J.N., BSc (UBC), MSc, PhD (U. of Western Ontario). Image processing & graphics, data visualization, animation.  
Smedley, T.J., BMath, MMath, PhD (Waterloo). Visual programming languages, multimedia, user interface design.  
Srinivas, BEng (Bangalore), PhD (Inst. of Science, Bangalore). Computer architecture, parallel and distributed computing, computer networks.  
Watters, C.R., BSc, MSc, MLS (Western Ontario), PhD (Technical University of Nova Scotia). Hypertext, information retrieval, electronic news, technology and learning, hypertext design and modelling.

## Assistant Professors

Blustein, J., BSc, MSc, PhD (Western). Hypertext and digital libraries, human-computer interaction.  
Gao, Q., MAsc, PhD (Waterloo). Vision, data mining.  
Japkowicz, N., BSc (McGill), MSc (Toronto), PhD (Rutgers). Artificial intelligence, machine learning, neural networks.  
McAllister, M.J., BMath (Waterloo), MSc, PhD (UBC). Computational geometry, discrete mathematics, algorithms.  
Sedgwick, A.E., MSc, PhD (Toronto). Programming languages, programming methodology.  
Upal, M.A., BSc (Punjab), BSc, MSc (Saskatchewan), PhD (Alberta). Artificial intelligence, intelligent software engineering, data mining, cognitive science.  
Zincir-Heywood, A.N., BSc, MSc, PhD (Ege U). Network information retrieval, network management, multilingual internet applications, web engineering, globalization and socio-economical factors.

## Adjunct Professors

Hartzman, C.S., MSc (Toronto), PhD (Colorado)  
Hutchinson, S., BA, BSc, MD (Dal)  
Sharma, M., BA (Dal)  
Trudel, A., BSc, MSc, PhD (Waterloo)

## Cross Appointments

Duffy, J., PhD (Iowa State), cross-appointment with School of Business. Business models for electronic commerce, user preferences and interface design, human resource management.  
Emodi, T., MES (York), Dean of Architecture, cross-appointment with Faculty of Architecture. Use of computer design for improvement of health in individuals, communities and the environment, and computer-mediated working and learning.  
Hughes, L., PhD (Newcastle upon Tyne), cross-appointment with Department of Electrical and Computer Engineering. Meta computing, operating systems, distributed systems, communication networks, protocol design, computer science education.  
Janssen, J., MS (Tech Univ Endhoven), PhD (Lehigh), cross-appointment with the Department of Mathematics and Statistics. Combinatorial optimization, graph colouring, on-line algorithms on graphs.  
Jutla, D., PhD (TUNS), cross-appointment with 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.  
Nowakowski, R., PhD (Calgary), cross-appointment with Department of Mathematics and Statistics. Measures on products of graphs, combinatorial game theory, independence and domination in graphs.  
Zitner, D., MD (Dal), cross-appointment with Faculty of Medicine. Medical informatics, medical outcomes, access to care, concurrent review, data mining, decision support, waiting times, human computer interface, electronic health record, medical vocabularies.

## Lecturers

Gates, C.E., BSc, MSc (Dalhousie). Neural networks, data mining, applied artificial intelligence.

## I. Introduction

The Faculty of Computer Science offers both masters and doctoral degree programs. The masters programme is available either with a traditional research-oriented thesis option, or with a project option and more classes designed for students interested in an advanced professional degree. Research in the Faculty has an interdisciplinary approach and addresses the following areas: Software Engineering and Applications, Data Collection, Storage and Analysis, Communications and Networks, Theory and Algorithms, Network & New Media Applications. Application areas include electronic commerce and computers in medicine. The opportunity exists for participation in industrially sponsored research through the Global Information Networking Institute (GINI).

The Faculty of Computer Science, including GINI, has a permanent home in a new building that was completed in October of 1999. Computing facilities include a network of UNIX workstations, X terminals, PCs and Macintosh computers powered by a Sun Enterprise 4000 server with four processors. A recently awarded major infrastructure grant from the Canadian Foundation for Innovation is funding new extensive research computing infrastructure. In addition to general purpose computers (UNIX, NT/Linux, Macintosh), the following laboratories are being equipped with specialized research tools: Network Performance lab (network testing software, CISCO routers, ATM switches), Software Testing lab, Usability lab (video equipment), Healthcare Informatics and TeleLearning lab (data mining software, hand-writing recognition software, infrared communications and palmtops), Electronic Commerce lab (database software, security software, firewall, hardware for smart cards, electronic payment system software).

**NOTE:** Completion of any or all software engineering classes offered by the Computer Science Department 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 Programmes

Please contact the Faculty of Computer Science Web site 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 of Computer Science programme with a thesis option or project option all students must have completed an undergraduate programme 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 programme. Students who substantially meet these requirements may be required to take additional specific undergraduate classes to make up deficiencies in addition to their graduate programme requirements.

Students who have completed, with high standing, an undergraduate programme in a discipline other than computer science may be admitted to a qualifying year or two-year programme. 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 programmes 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 Web site 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 e-mail to [admissions@dal.ca](mailto:admissions@dal.ca). Application forms are also available for downloading on the following website: <http://www.cs.dal.ca> (graduate).

GRE is not required, but it may be helpful in evaluating overseas applications.

## 4. Academic Regulations

### Programme Requirements

Students are admitted into either MSc (Thesis) or MSc (Project). The thesis option is a research-oriented degree, and a research master's degree is normally required to gain subsequent admission into a Ph.D. programme at most universities. Candidates' programme 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. Only students in the thesis option are eligible for funding.

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;
- at least 2 classes in each of two different areas.

### Thesis Option

An MSc thesis option 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.

### Project Option

A MSc project option 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 programme. Students who enter the programme 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's Global Information Networking Institute, 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 programme consists 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 programme 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 programme 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 programme please see the Electronic Commerce entry in this calendar. Please also visit the programme's web site at <http://www.ecomm.dal.ca> for information concerning updates to the programme's regulations and class offerings. Email queries to can be addressed to [mec@cs.dal.ca](mailto:mec@cs.dal.ca).

## C. Doctor of Philosophy Degree

### 1. Admission Requirements

To be admitted, students must have completed a research (thesis) Master's degree programme 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 MSc (Thesis) programme with the possibility of transferring to the doctoral programme within the first 15 months (subject to approval of the Graduate committee and the Faculty of Graduate Studies).

### 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 Web site 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 by electronic mail.

## IV. 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 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 6201.03: Advanced Operating Systems.

The main emphasis is on three aspects of current advances in operating systems; the invocation, allocation and control of resources; improvements in reliability by efficient combination of software and specific functions of the hardware; and the provision of efficient and secure interprocess communications.

### CSCI 6202.03: Computer Aided Synthesis and Design of Digital Systems.

This class will explore the methodologies and algorithms used to automate the design of large scale digital systems. Topics will include hardware description languages, logic synthesis (boolean minimization, technology mapping, and state machine synthesis), high level synthesis (resource allocation and scheduling), and physical design (placement and routing algorithms, and verification techniques such as circuit extraction).

Students will be expected to read selected papers from current research literature and present class seminars on assigned topics.  
PREREQUISITES: CSCI 3121.03 and 3123.03

### 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 6303.03: Methodology of Software Evaluation.

Various views on the evaluation of software will be presented. Topics covered include: user interface, run-time efficiency, problem solving power. Implementational issues will be analyzed, in particular, portability, life span, maintenance and reusability. Sample software systems will be provided and analyzed.

### 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 6305.03: Process-Object Oriented Software.

This class introduces the new concept of high-level process-object oriented software, motivated by multimedia and WAN distributed interactive applications. Topics include recent developments in integrating thread management into programming languages, a hierarchical process-object model, various modes of interprocess communication, the use of Petri nets as a model for direct communication, and the integration of hierarchical process management with the resource-sharing model of object orientation. Sample applications are discussed.

### 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 6402.03: Advanced Topics in Database Systems.**

Topics vary from year to year depending on the interests of the students and the instructors. Past topics have included concurrency control, scheduling, query optimization and object-oriented databases.

PREREQUISITE: CSCI 4141

EXCLUSION: COMP 5700.03

### **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.

PREREQUISITES: CSCI 3120.03 or 4172.03

### **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 6502.03: Artificial Intelligence and Design.**

Design and the generation, analysis and exploration of individual designs is at the heart of most technical disciplines. The Architect, Engineer and Computer Scientist all must generate designs, while satisfying the constraints imposed by form, function, and resource limitations. This class examines how computers can be used to both generate new designs and assist in design generation, exploration and analysis. This interdisciplinary class is open to students from any technical design oriented discipline.

PREREQUISITE: CSCI 3150 or equivalent

### **CSCI 6503.03: Computer Vision.**

Computer vision, also known as computational perception, a diverse and interdisciplinary body of knowledge and techniques, has as its goal to understand the principles behind the processes that interpret perceptual signals provided by various sensors. This class introduces the fundamental concepts and paradigms for computer vision which include: sensing and image formation, early processing and image segmentation, visual knowledge representation and recognition strategies. Some application domains of both 2D and 3D vision are reviewed.

PREREQUISITES: CSCI 2130 and permission of the instructor

### **CSCI 6504.03: Advanced Topics in Software Agents.**

Recent work on agents is founded on work in Artificial Intelligence, and in particular knowledge representation and distributed AI. With the emergence and growth of the Internet, agents that help users deal with the enormous complexity of the information available have been proposed and implemented. The class will be an applications-oriented in-depth review of current literature with emphasis on the underlying conceptual foundations, and on agent systems for information retrieval on the World Wide Web.

PREREQUISITES: CSCI 3150.03 or equivalent

### **CSCI 6505.03: Machine Learning.**

The class introduces the principles and paradigms underlying Machine learning, the area of Artificial Intelligence concerned with the problem of building computer programs that automatically

improve with experience. Topics include Decision trees, artificial Neural Networks, Bayesian Learning, Instance-based Learning, Unsupervised Learning, and Combinations of Classifiers.

PREREQUISITES: CSCI 3150.03 or equivalent

### **CSCI 6506.03: Genetic Algorithms and Programming.**

Forms of evolutionary programming and shared generic components. Genetic algorithms and Holland's Schema Theorem. Genetic programming - linear and tree-based structures. Performance metrics and assessment. Evolutionary computation and neural networks. Application case studies.

### **CSCI 6601.03: Introduction to CAD/CAM Software and Hardware.**

The class introduces the principles of computer-aided design, computer-aided manufacturing, and computer graphics systems. Programming considerations are discussed. Examples are given of CAD/CAM applications. The selection and application of CAD/CAM systems are discussed.

### **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 6603.03: Applied Digital Image Processing.**

Students will apply digital picture processing techniques gained in CSCI6602. This class will consist of a major term project involving the development of an integrated image processing system. The class will simulate a work environment; the term project will be done by team(s) with the instructor filling the role of Project Manager.

PREREQUISITE: CSCI 6602.03 or equivalent

### **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 6605.03: Advanced Topics in Multimedia Systems.**

This class will briefly introduce students to a broad range of topics related to multimedia including multimedia production topics such as: scripting languages, synchronisation, network delivery, production requirements; and digital media topics such as: video, graphics, sound, animation, 3d graphics and animation. Students will further investigate specific areas of interest in depth, presenting in-class seminars and producing a major term project on their chosen area.

PREREQUISITES: CSCI 3120.03

### **CSCI 6606.03: Human Factors in On-Line Information Systems.**

Introduction to issues related to behavioural/human aspects of computing as applied to hypertext and other on-line information tools.

### **CSCI 6701.03: Advanced Distributed Systems.**

This class examines a number of issues surrounding present and future data communication systems from the viewpoint of the software engineer. The class begins with a review of several well-known networks and protocols. This review is followed by an in-depth examination of a number of networks including IEEE 802.4 and 802.5, FDDI, and CFR, and protocols, such as IEEE 802.2, IP, and SPTP. In addition, reliability issues, gateway design, multicast communication, protocol development tools and ISDN are also discussed.

**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 6703.03: Topics in Vector and Parallel Computing.**

This class is designed to provide a wide range of concepts involved in vector and parallel supercomputing. Topics include pipeline and vector processing, SIMD and MIMD processing, interconnection networks, parallelization techniques, parallel algorithm design strategies. Architecture and applications of important parallel computers are discussed.

PREREQUISITE: CSCI 3121 or CSCI 4121

EXCLUSION: COMP 5360.03

**CSCI 6704.03: Advanced Topics in Computer Networks.**

Topics covered include Design and operation of computer networks, Gigabit Networking, Fibre Optics and SONET standards, Cell Networking, Asynchronous Transfer Mode, Wide Area and Local Area Cell networks, Gigabit packet networks, Applications, Internetworking Protocols, Traffic Modelling and Performance Issues, Switch Architectures and current research areas. Practical aspects of network software design are also discussed.

PREREQUISITE: CSCI 4170 or CSCI 4171

EXCLUSION: COMP 5550.03

**CSCI 6705.03: Computers and Telephony.**

The class will explore the architecture of the Public Switched Telephone Network (PSTN), focusing on the concepts surrounding the evolution of the Advanced Intelligent Network (AIN). Topics include recent developments in areas such as the SS7 protocol stack, the TCAP protocol, Integrated Services Digital Networks (ISDN), Service Control Points (SCP), Service Switching Points (SSP) and Signal Transfer Points (STP), call setup and routing, and Computer-Telephony Interface (CTI). Class enrollment will be limited and students will work as a team on a significant term project.

PREREQUISITE: CSCI4170 or CSCI4171, and permission of the instructor

**CSCI 6706.03: Enterprise Information Systems Architecture.**

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. The class will be a broad introduction to concepts and services underlying outsourcing systems management.

PREREQUISITE: CSCI 4171.03

**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 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 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.

**CSCI 9000.00: Graduate Thesis.**

# Earth Sciences

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Location: Life Sciences Centre, Room 3006  
1355 Oxford Street  
Halifax, NS B3H 4J1  
Telephone: (902) 494-2358  
Fax: (902) 494-6889  
Website: <http://meguma.earthsciences.dal.ca/es-home.htm>

## Chair of Department

Reynolds, P.H.

## Graduate Co-ordinator

Culshaw, N.

## Professors Emeriti

Cooke, H.B.S., MSc, DSc (Witwatersrand)  
Medioli, F.S., PhD (Parma)  
Milligan, G.C., MSc (Dal), PhD (Harv)

## Professors

Clarke, D.B., BSc, MA (Toronto), PhD (Edin). Mineralogy, igneous petrology and geochemistry: petrogenesis of peraluminous granites; studies in the Meguma Zone of Nova Scotia; materials science  
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.  
Reynolds, P.H., BSc (Toronto), PhD (UBC).  $^{40}\text{Ar}/^{39}\text{Ar}$  geochronology: application of laserprobe; thermochronological constraints on tectonics in orogenic belts  
Scott, D.B., BSc (Wash), MSc (Wash State), PhD (Dal). Micropaleontology and marine geology: microfossils for use in environmental geology of coastal areas; deep-sea paleo-oceanography  
Zentilli, M., BSc (Chile), PhD (Queen's). Mineral deposits geology; Andean tectonics, basin analysis, and metallogenesis; fission track thermochronology

## Associate Professors

Culshaw, N.G., BA (Keele), PhD (Ottawa). Structural geology and tectonics: Grenville Province; Meguma terrane, Nova Scotia; Makkovik Province, Labrador  
Godfrey-Smith, D., BA (Calgary), PhD (SFU). Optical dating and thermoluminescence: response of common silicates and carbonates; dating of Quaternary volcanic deposits  
Ryall, P.J.C., BSc (Dal), MSc (Alta), PhD (Dal). Geophysics: magnetic properties of ocean crust; gravity surveys

## Associate Professor (Research)

Muecke, G., BSc, MSc (Alta), DPhil (Oxon), Petrology and geochemistry: magmatic evolution of extensional basins

## Research Associates

Boyd, R., BSc, PhD (Sydney), University of Newcastle  
Gayes, P., BSc (SUNY), MSc (Pennsylvania), PhD (SUNY)  
Ruffman, A., MSc (Dal), Geomarine Associates Ltd.  
Williams, G., BSc (London), PhD (Sheffield), GSC Atlantic

## Adjunct Professors

Barr, S., BSc (UNB), PhD (UBC), Acadia University

Calder, J., BSc (Saint Mary's), PhD (Dal), NS Natural Resources  
Dostal, J., BSc (Charles), PhD (McMaster), Saint Mary's University  
Graves, M., BSc (Idaho), MSc (Dal), Cuesta Research, Ltd.  
Kontak, D.J., BSc (St. FX), MSc (Alberta), PhD (Queen's), NS Department of Natural Resources  
Kronfeld, J., BA (Queens College, NY), MSc (Florida State), PhD (Rice) Tel Aviv University  
Mann, H., BSc, BEd (SMU), MSc, PhD (Western), Saint Mary's University  
Melchin, M., MSc (Waterloo), PhD (Western), St. Francis Xavier University  
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  
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  
Raeside, R., BSc (Aberdeen), MSc (Queen's), PhD (Calgary), Acadia University  
Robinson, P.T., BSc (Mich), PhD (Calif). Volcanology and ocean crustal studies: petrology of oceanic lithosphere; geochemistry of ophiolites  
Salisbury, M.H., BSc (MIT), MSc, PhD (Wash), GSC Atlantic  
Stanley, C.R., AB (Dartmouth College), MSc, PhD (UBC), Acadia University  
Stea, R., BSc (Acadia), MSc, PhD (Dal), NS Dept of Natural Resources  
van Wagoner, N., BA, BSc (Cal State), PhD (Dal), Acadia University  
Waldron, J., BA (Cambridge), PhD (Edinburgh), University of Alberta  
Williamson, M., BSc, MSc (Wales), PhD (Dal), GSC Atlantic

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.

## I. 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.

## II. Degree Programmes

### A. MSc Degree Programme

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). 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 programme 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. EARTH 6300.03 and EARTH 6350.03 are compulsory.

## **B. PhD Degree Programme**

The minimum time required to complete this programme is two years from an MSc; normally three years are required (see Section 1.3.2 in the Faculty of Graduate Studies regulations).

The preliminary examination (see Faculty of Graduate Studies regulations) is an integral part of the compulsory classes, EARTH 6300.03 and 6350.03.

Attendance at the Earth Sciences seminars is expected.

Research leading to the preparation and oral defence of a thesis is required.

## **III. Classes Offered**

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 and Mineralogy.**

This class is an introduction to the various concepts and techniques utilized by geologists in their study and evaluation of economic concentrations of metals, industrial minerals and energy resources, and of basic principles of mining and metallurgical engineering where geology plays a significant role. The successive stages of an exploration project are analyzed, from reconnaissance through target appraisal, drilling, metallurgical studies to mine development, mining methods, environmental assessment and land rehabilitation. Legal (e.g. staking, mineral rights) and economic aspects (e.g. budgets, prices, grade and tonnage, reserve calculations, net smelter return) will be introduced. Environmental mineralogy, for instance as it affects acid rock drainage, is covered. The syllabus will vary somewhat from year to year to reflect the interests and backgrounds of the students, and availability of lecturers. Labs will consist of practical exercises with rocks and minerals, problem solving, seminar presentations and discussions.  
INSTRUCTOR: M. Zentilli and invited lecturers  
FORMAT: Lecture 3 hours, lab 3 hours

### **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: M. Zentilli  
FORMAT: Lecture 3 hours, lab 3 hours

### **ERTH 5152.03: Fossil Fuels.**

The class provides an introduction to the principal fossil fuels: peat and coal, oil shale, oil and natural gas, and uranium. We will discuss the chemical nature of each type of fuel, as well as biological and physiochemical factors involved in its genesis and concentration within the earth. The class will also consider practical methods used in resource evaluation and geological and geopolitical factors that make extraction of raw fuel feasible. Economically important deposits in Canada and worldwide will be discussed.  
INSTRUCTOR: M. Gibling  
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 and 3130.03 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: P.J.C. Ryall  
FORMAT: Lecture 3 hours, lab

### **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: K. Louden  
FORMAT: Lecture 3 hours, lab

### **ERTH 5350.03: Tectonics.**

This is a required class for Earth Sciences Honours students. It is intended to synthesize the various aspects of geology covered in the third year core programme. 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: N. Culshaw  
FORMAT: Lecture 3 hours

### **ERTH 5380.03: Advanced Geochemistry.**

This class begins with a review of the Periodic Table and a discussion of nomenclature, properties, and classification of the elements. The next section on Cosmochemistry covers the origin and distribution of elements including the transuranic superheavies, condensation sequences, origin of solar system and planets, bulk composition and differentiation of the Earth, and origin of the Moon. A major section on Isotope Geochemistry covers the systematics and examples of radiogenic (Rb-Sr, Sm-Nd, U-Pb) and stable (H, C, O, S) isotopic systems. Two other sections cover Geochemical Cycles in the endogenic environment (transfer of elements in the interior of the Earth, and litho-geochemistry in petrogenetic studies of igneous, sedimentary, and metamorphic rocks), and exogenic environments (lithosphere, atmosphere, biosphere, hydrosphere). A final section on Applied Geochemistry covers the principles and examples of forensic (natural and criminal), exploration, and environmental geochemistry.  
INSTRUCTOR: D.B. Clarke

### **ERTH 5400.03: Advanced Metamorphic Petrology.**

Metamorphic rocks are considered as equilibrium systems. The role of fluids in metamorphism, metasomatism and mass transport, kinetics of metamorphic processes, microstructure, and textural development of metamorphic rocks are discussed. The use of metamorphic data in tectonic analysis is considered at length. Laboratory projects and special topics are chosen to suit the students' interests. This class is offered subject to interest.  
INSTRUCTOR: R.A. Jamieson  
FORMAT: Lecture 3 hours

### **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: 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 EARTH 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: G.K. Muecke

FORMAT: Lecture 2 hours, lab 4 hours

PRE-REQUISITE: EARTH 3500.03 or SCIE 3600X/Y.06, STAT 1060.03, or permission of Instructor

### **ERTH 5600.03: Geographic Information Systems (GIS).**

This class provides a general overview of Geographic Information Systems (GIS), examines what GIS is, what it can do, and how it works. This class is aimed at non-geoscientists (planners, business majors, etc.). It will include topics such as network analysis, address matching, shape analysis. Lectures are common to all students in the class, while laboratory sessions will be tailored to meet the needs of different disciplines and programmes. Students are expected to complete and present a GIS project related to their field of research.

Laboratories: A general laboratory section will familiarize students with a mix of applications; discipline-oriented sessions will be provided to meet the needs of programmes (e.g. urban planning, biology) when enrollments of approximately 12 can be attained.

INSTRUCTOR: G. K. Muecke

FORMAT: Lecture 3 hours, lab 3 hours

The following classes are designed specifically for graduate 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 6150.06: Metallogeny in Mineral Exploration.**

### **ERTH 6160.06: Research Topics in Sedimentary Geology I.**

### **ERTH 6170.06: Research Topics in Sedimentary Geology II.**

### **ERTH 6250.03: Directed Studies.**

### **ERTH 6300.03: Research Presentation and Design in Earth Sciences.**

### **ERTH 6350.03: Research Topics in Earth Sciences**

### **ERTH 6500.03: Graduate Seminar in Tectonics**

All graduate students must be registered in one of:

### **ERTH 9000.00: MSc Thesis.**

### **ERTH 9530.00: PhD Thesis.**

# Economics

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Halifax, NS B3H 3J5  
Telephone: (902) 494-2026  
Fax: (902) 494-6917  
Website: <http://www.economics.dal.ca>

## Chairperson of Department

Lesser, B.

## Faculty Advisors

Iscan, T., Graduate Coordinator (494-6994)  
Dayton-Johnson, J., MDE Coordinator (494-6999)

## Professors Emeriti

Cornwall, J.L., BA (Iowa), MSc (London), PhD (Harvard), FRSC  
Konczacki, Z.A., BSc (London), BEcon(Hons) (Natal), PhD (London)  
Sinclair, A.M., BA (Dal), MA, BPhil (Oxon), PhD (Harvard)

## Professors

Bradfield, F.M., BComm (McMaster), PhD (Brown)  
Dasgupta, S., BA (Calcutta), MA (Delhi), PhD (Rochester)  
Lesser, B., BComm (Dal), MA, PhD (Cornell)  
Marfels, C., Diplom-Volkswirt, Dr Rer Pol (Berlin)  
McAllister, R.I., MA (Oxon), MA (Cantab)  
Osberg, L., BA(Hons) (Queen's), MPhil, PhD (Yale), McCulloch  
Professor of Economics  
Phipps, S., BA(Hon) (Victoria), MA, PhD (UBC), Maxwell Professor  
of Economics  
Rao, U.L.G., MA, MSc (Andhra), PhD (Western)

## Associate Professors

Burton, P., BSc (Sask), MA, PhD (UBC)  
Cross, M.L., AA (Dawson College), BA (Hons) (Montana), MA (SFU), PhD (Texas A&M)  
Hoddnott, J., BA(Hons) (Toronto), MA (York), MA, DPhil (Oxon)  
Iscan, T.B., MA, PhD (Cornell)  
Xu, K., MBA, PhD (Concordia)

## Assistant Professors

Cyrus, T., BA (UCLA), PhD (Berkeley)  
Dayton-Johnson, J., BA, PhD (Berkeley)

## Honorary Adjunct Professors

Amirkhalkhali, S., BAHons (Shiraz), MA, PhD (Dal), Saint Mary's  
University  
Comeau, R.L., BA, MA (StFX.), PhD (Brown) (retired)  
Cornwall, J.L., BA (Iowa), MSc (London), PhD (Harvard),  
Dalhousie (retired) (Professor Emeritus)  
Cornwall, W., BA (MSVU), PhD (Dal), Mount St. Vincent  
University  
George, R., BSc (London), MSc (Bristol), PhD (London) (retired)  
Huber, P.B., BA, MA, PhD (Yale)  
Klein, E., LL.M. (Buenos Aires), MSc (Dal), Dr Rer Pol (Hamburg)  
Pinfold, BA, MA (Western), PhD (Minn)  
Rankaduwa, W., BA, MSc (Sri Lanka), MA, PhD (Dal), UPEI  
Sharif, N., BA (Punjab), MA (Dacca), MA, PhD (McMaster)  
Sinclair, A.M., BA (Dal), MA, BPhil (Oxon), PhD (Harvard)

## Cross Appointments

Curtis, L., BSc (Hons) (Trent), MA, PhD (McMaster), major  
appointment in Community Health and Epidemiology

## Postdoctoral Fellows

Kingston-Riechers, J., PhD (McMaster)

## 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 Programme requires an Honours BA in Economics (or equivalent) with an average of at least 75% (B+) at Dalhousie standards in classes in Economics and related fields. Normally this means completion of at least eight classes in Economics beyond the introductory level including classes in Economic Theory beyond the intermediate level, Statistics, Econometrics and classes in areas related to some of the fields of specialization, other than Economic Theory or Econometrics, that are listed below under Programme Choices. Mathematics classes which are equivalent to Dalhousie MATH 1000.03 and 2030.03 are also required.

Promising students who do not meet the entrance requirements for the programmes may be admitted to a Qualifying Year to permit them to bring their work up to full admission standards, or may be considered for a two year MA.

Applicants should also consult "Admissions Requirements," which includes regulations on "English Language Proficiency".

#### b) Programme Choices

The department offers the MA in the following areas of specialization:

- Economic 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 programme of each student.

#### c) Interdisciplinary Programmes

The Department of Economics participates with other Departments and Institutions in several such programmes. These include:

- Environmental Studies
- Health Evaluation Studies
- Urban, Rural, and Regional Studies

Graduate students wishing to orient their studies in the direction of these interdisciplinary fields take some classes in the relevant area from offerings outside the Department and do their graduate thesis on related topics. The Department's approval of such a programme is required. Other special interdisciplinary programmes may be devised, with the Department's consent, to meet particular interests.

#### d) Completion of MA Programme

Students must successfully complete the required and optional classes of their programme. Normally a class of study include:

- ECON 5500.03: Macroeconomic Theory
- ECON 5509.03: Microeconomic Theory
- ECON 5521.03: Math for Economists
- ECON 5575.03: /5576.03: Statistics/Econometrics
- 1 ½ elective classes
- a thesis which must be submitted and approved by the Department

### B. Master of Development Economics (MDE)

#### a) Admission Requirements

The normal duration of the programme is two years; although applicants with the equivalent of some graduate level training or a professional degree (such as MPA, MBA, LLB or MES) may be eligible for a one-year programme. Also, candidates with first-class undergraduate degrees with a major in Economics or International Development may be considered for a one year programme.

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 programme from candidates possessing an undergraduate degree with an academic average of at least 75% (B+) at Dalhousie standards. Because of its interdisciplinary nature, applicants may possess a BA, BSC or BComm degree, but all candidates must have at least two classes in Economics beyond the introductory level, plus a basic class in statistics.

Promising students who do not meet these requirements may be considered for admittance to a Qualifying Year. In exceptional circumstances, a highly qualified candidate may be admitted to the two year programme and permitted to take missing economics classes within the first year of the two year programme.

#### b) Programme Choices

The MDE Programme permits students to follow one of two paths:

- The Canadian Development Studies Programme concentrates on the analysis of Canadian development, policies and experiences, with comparative insights from other countries, including the European Union member states. Primary emphasis in the programme is placed on social and labour market policy and on less developed regions, with special attention to the Atlantic Provinces.
- The International Development Studies Programme concentrates both on developing nations and transition economics. Integrating themes include urban and rural planning, human resource development and social capital, state corporations, international trade and payments, import substitution policies, international and bilateral aid, disaster relief, health, IT and environmental issues, women in development, and the problem of helping those in greatest need. Specific country experiences will be extensively drawn upon through links the University faculty has with West Africa, East Africa, Indonesia, the Philippines, Latin America, the Baltic states, the European Union, the Caribbean, China, Nepal and India.

For both programme options, students should select classes to achieve a blend of economics and at least one of the disciplines of business/public administration, law, public health, education, IT, environmental studies, history, music, political science, sociology and social anthropology. Class selection should also facilitate skill development in: the ability to think numerically, to interpret data, and to apply economic logic to real issues; computer literacy; and a sensitivity to human behaviour and different cultures. For both programme options, first-hand field exposure is encouraged both through class frameworks, internships, and thesis research.

#### c) Completion of MDE Programme

Students in a full two-year programme must normally complete six full-credit classes plus thesis. In some cases, this number of classes may be reduced on the basis of advanced placement granted for previous work.

### C. Doctor of Philosophy (PhD)

#### a) Admission Requirements

Applicants for admission to the PhD programme must have academic qualifications superior to those required for entrance into the MA programme. The minimum required for entry is an Honours Degree in Economics with an average of at least 80% (A-) by Dalhousie standards in the classes in economics and related fields. Students entering after completing the required class work for an MA degree in Economics would normally prepare for their PhD Comprehensive Exams in two years; those with only an Honours BA would normally require three years. In addition to the entrance requirements above, students are expected to have completed classes, at a satisfactory level, in Intermediate Calculus, Matrix and Linear Algebra, and Statistics (equivalent to Dalhousie MATH 2000.06, 2030.03, 2040.03, 2060.03 and 2080.03).

Applicants may be required to submit the results of the Graduate Record Examination in Economics with their application. They should also consult Faculty of Graduate Studies Regulations on admission requirements and English language proficiency.

#### b) Programme Choices

The department offers the PhD in the following areas of specialization:

- Econometrics
- Economic Theory (Microeconomics) (Macroeconomics)
- Industrial Organization
- Labour Economics and Social Policy
- Resource Economics

Students admitted to a two-year PhD programme may choose any area of specialization. Students admitted to a three-year PhD programme may do so after having satisfactorily completed a prescribed class of study during their first year. Departmental approval is required for the programme of each student.

The structure of the PhD programme is described below.

The PhD Programme is designed to provide students with a strong foundation in economic theory and quantitative methods and intensive work in two applied fields of economics. At the completion of their class work, candidates for the PhD Programme will be examined in:

1. Macroeconomic and Microeconomic theory (at the level of Dalhousie Economics classes 5500.03, 5509.03, 6600.03 and 6609.03, including applications of the economic theory described)
2. Two fields of specialization
3. History of Economic Thought

They are also required to show proficiency in Quantitative Analysis and Economic History in the class of their work. A class of study recommended for the two-year PhD Programme would include:

#### Year 1

1. ECON 5500.03 (Macroeconomic theory)
2. ECON 5509.03 (Microeconomic theory)
3. ECON 5506.06 (Economic History as available)
4. Two elective classes

#### Year 2

1. ECON 6600.03 (Macroeconomic theory)
2. ECON 6609.03 (Microeconomic theory)
3. ECON 5533.06 (Econometrics)
4. Two elective classes

#### c) Examination and Thesis

Comprehensive examinations consisting of written papers in economic theory and two fields, and oral examinations in the same three subjects, are required at the end of the required period of class work.

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. Classes Offered

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: Economic Theory for MDE.

This class provides an intensive overview of microeconomic analysis as background for the analysis of economic development. Special emphasis is given to the theory of market failure: what are the consequences when markets are not perfect? Assignments will apply microeconomic theory to development problems including peasant agriculture, trade policy, population growth, and many other issues. During periodic seminar-style class meetings we discuss classic and current readings in development theory.

INSTRUCTOR: J. Dayton-Johnson

FORMAT: Lecture 3 hours

PREREQUISITES: ECON 2200.03 or ECON 2210.03, and ECON 2201.03

### **ECON 5001.03: Economic Theory for MDE.**

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, which is the most relevant framework for advancing economies. 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 crisis, examine the causes and consequences of currency crises, and explore the emerging international financial system.

FORMAT: T. Iscan

FORMAT: Lecture 3 hours

PREREQUISITE: ECON 2200.03 or ECON 2210.03 and ECON 2201.03

### **ECON 5250/Y.06: Applied Development: Policy, Practice and Economics.**

This class traces how and why post-World War II theories of, and approaches to, economic development have broadened from a somewhat narrow emphasis on growth to increased concern for meeting the basic needs of the poor, recognition of the importance of social capital, human rights, and environmental sustainability. In the first term the main focus is on development project planning, analysis and execution; in the second term the main focus is on national and regional level policy and programming - including foreign aid, disaster relief and regional development theory and practice. An international case study approach is used during the class and fieldwork in the Atlantic region provides a comparative component. The importance of insights from a number of disciplines is emphasized and a cross-section of faculty and officials participate as guest speakers at key stages. The class normally concludes with presentations at a public conference, hosted by the group.

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: Ian McAllister

FORMAT: Seminar 2 ½ hours

### **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 programme. 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 programme. 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.

INSTRUCTOR: B. Lesser

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, relief and economic development. Analytical frameworks for better understanding the reasons behind a cross-section of disasters are explored - as aids to improving development planning at both project and broader policy levels. Main themes include food and clean water, security, distribution and drought reduction; refugees, asylum seekers and settlements for sustainable development; early warning systems for cyclones 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 International Peacekeeping Training Centre, as a part of the class's applied orientation. Internship experiences are frequently organized as an extension of this class.

INSTRUCTOR: I. McAllister

FORMAT: Seminar 2 ½ 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 labour and credit markets (with applications to child labour and microcredit); use of common property resources; growth and distribution; development and globalization.

INSTRUCTOR: J. Hoddinott

FORMAT: Lecture 2 ½ hours

### **ECON 5334.03: Economic Development. Recent Debates, Controversies and Conflicts.**

### **ECON 5350.03: Social Cost Benefit Analysis.**

The methodological base of social cost benefit analysis is developed, demonstrating some practical applications. Social cost benefit analysis and capital budgeting are two approaches to investment decision making. The former is used by public sector agencies; the latter is employed by private sector firms.

Similarities and differences in the two approaches are highlighted. Solving problems which illustrate basic concepts and a paper reporting on an actual application of the methods taught are important requisites.

INSTRUCTOR: T. Pinfold

FORMAT: Lecture 2 hours

PREREQUISITES: ECON 1101.03, ECON 1102.03, ECON 2200.03 or ECON 2210.03 and Introductory Statistics are desirable

### **ECON 5431.03: International Finance.**

This class deals with the theory of balance of payments under different arrangements, foreign exchange market, foreign exchange rate dynamics and determination, open economies under fixed and flexible exchange rate systems, the European monetary system, and international policy coordination. Students should have a good background in macroeconomics and econometrics. Final grades are based on research papers and examinations.

INSTRUCTOR: T. Cyrus

FORMAT: Lecture 3 hours

PREREQUISITES: 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.

INSTRUCTOR: T. Iscan

FORMAT: Seminar 3 hours

### **ECON 5502.03: Monetary Theory: Microeconomic Aspects.**

This class focuses on the financial behaviour 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 behaviour of the economic agents who demand and supply financial assets; and (4) the framework in which monetary policy can be analyzed.

INSTRUCTOR: K. Xu

PREREQUISITES: 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 programmes. How might we measure poverty or inequality? How should we make interpersonal comparisons?

INSTRUCTOR: S. Phipps  
FORMAT: Lecture 3 hours

### **ECON 5509.03: Microeconomic Theory I.**

This class in microeconomic theory is required in the MA programme. 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).

INSTRUCTOR: S. Dasgupta  
FORMAT: Lecture 3 hours

### **ECON 5513.03: Regional Economics: Analysis 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 labour markets, technological change, and market structures.

INSTRUCTOR: M. Bradford  
FORMAT: Lecture 3 hours

### **ECON 5514.03: Monetary 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.

INSTRUCTOR: K. Xu

PREREQUISITES: 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.

INSTRUCTOR: P. Burton or M.L. Cross

FORMAT: Lecture 3 hours

PREREQUISITES: 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.

INSTRUCTOR: P. Burton or M.L. Cross

FORMAT: Lecture 3 hours

PREREQUISITES: 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.

INSTRUCTOR: C. Marfels

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.

INSTRUCTORS: P. Burton or S. Dasgupta

FORMAT: Lecture 3 hours

PREREQUISITES: ECON 5509.03, 5521.03 or permission of instructor

### **ECON 5521.03: Mathematics for Economists.**

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 (linear dependence, determinants, quadratic forms, characteristic roots), analysis (limits and continuity, multi-variate differential calculus), convex functions, constrained optimization, difference equations.

INSTRUCTOR: S. Dasgupta

FORMAT: Lecture 3 hours

PREREQUISITES: MATH 1000.03, MATH 2030.03, or permission of instructor

### **ECON 5522.03: Labour Economics I.**

This class provides an in-depth survey of modern Labour Economics, focusing on trends in labour supply, human capital theory, structural change in labour markets, labour market segmentation; information and job search, unemployment and unemployment insurance and trends in earnings inequality. Most of the discussion is based on recent journal articles. Students are graded on the basis of essays and a final exam.

INSTRUCTOR: L. Osberg or S. Phipps

FORMAT: Lecture 3 hours

**ECON 5534.03: Econometrics.**

In this class the single 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.

INSTRUCTOR: U.L.G. Rao

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.**

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.

INSTRUCTOR: U.L.G. Rao

FORMAT: Lecture 3 hours

PREREQUISITE: ECON 5534.03

**ECON 5563X/Y.06: Special Topics in Regional Economics.**

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: F.M. Bradfield

**ECON 5575.03: Applied Statistics and 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 and used in class projects. An important aim of this class is to give the student a working knowledge of estimation techniques commonly used by economists.

INSTRUCTOR: U.L.G. Rao or K. Xu

FORMAT: Lecture 3 hours

PREREQUISITES: ECON 2280.03 (or STAT 2080.03) and intermediate economic theory classes

**ECON 5576.03: Applied Statistics and 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 work in Economics, and to examine critically the results of such work. The topics include problems of specification and measurement, and some special models are introduced. These include distributed lag models, autoregressive models, and limited dependent variable models. Additional topics are simultaneous-equation models and time series models.

INSTRUCTOR: U.L.G. Rao or K. Xu

FORMAT: Lecture 3 hours

PREREQUISITE: ECON 5575.03

**ECON 5601.03: Special Topics in Macroeconomics.**

INSTRUCTOR: T. Iscan

**ECON 5659.03: Special Topics in Labour Economics.**

INSTRUCTOR: L. Osberg

**ECON 5670.03: Special Topics in Econometrics.**

INSTRUCTOR: G. Rao

**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.

INSTRUCTORS: T. Iscan

FORMAT: Seminar 3 hours

**ECON 6609.03: Microeconomic Theory II.**

This class in microeconomic theory is required in the general PhD programme. 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).

INSTRUCTORS: S. Dasgupta

FORMAT: Seminar 3 hours

**ECON 6680X/Y.06: Directed Reading.**

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.

**ECON 9000.00: MA Thesis.****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.

# Education

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Location: Faculty of Graduate Studies  
Room 314, Arts and Administration Building  
Halifax, NS B3H 4H6  
Telephone: (902) 494-2485  
Fax: (902) 494-8797

There will be no new admissions or readmissions to the MEd or MA or PhD in Education. All graduate students currently enrolled in Masters and Doctoral programmes should refer to the 1995/96 Graduate Studies calendar for programme regulations and class descriptions. Students should contact the Faculty of Graduate Studies for any matters related to their programme.

## Professor Emeritus

Friedenberg, E.Z., BA (Centenary), MA (Stanford), PhD (Chicago)

## Professors

Ricker, E.W., BA, MEd (UBC), PhD (Toronto), major appointment in School of Public Administration

## Adjunct Professors

Auger, J., BA, MA, PhD (UBC), Acadia University  
Barton, A., BA, MA (Trinity)  
Bérard, R.N., BA (Antioch), MA (McMaster), BEd (Dal), PhD (McMaster), Mount Saint Vincent University  
Crowley, M., BA (Miami), MAT (Johns Hopkins), PhD (Maryland), Mount Saint Vincent University  
Fisk, L.J., BA, BDIV (Alberta), MA (Queen's), PhD (Alberta)  
French, F., BA, MEd (Memorial), PhD (Alta); Mount Saint Vincent University  
Gamberg, R., BA (Brandeis), MA (Ill)  
Hare, W., BA (London), MA (Leicester), PhD (Toronto)  
Kelly, U.A., BA, BEd, MEd (Memorial), PhD (Toronto)  
Laidlaw, T., BA, MEd (Calgary), PhD (Alta), major appointment in Medicine  
Manicom, D.A., BEd (McGill), MEd (AIE), PhD (Toronto), Mount Saint Vincent University  
Manos, J., BA, BEd (StFX), MEd (Calgary), PhD (Alta), Mount Saint Vincent University  
McGee, H., BA, MA (Florida State), PhD (Southern Illinois); Saint Mary's University  
Murphy, H.J., BSc (St.Dunstan's), BEd (UPEI), MEd, EdD (Virginia), major appointment in Dentistry  
Plumb, D., BA (Alta), MEd (Sask), PhD (Alta), Mount Saint Vincent University  
Portelli, J., BA (Malta), MA, PhD (McGill); Mount Saint Vincent University  
Roald, J., BEd (UBC), MA (Wash), EdD (UBC)  
Semple, S., BA, DipEd (Sid), MEd, EdD (Toronto)  
Sullivan, K.C., BSc, BEd (Dal), MEd, PhD (Alta), major appointment in School of Public Administration  
Welton, M., BA, MA, PhD (UBC), Mount Saint Vincent University  
Wright, W.A., BA (MtA), MA (McGill), PhD (Montreal), major appointment in Office of Instructional Development

# Electrical and Computer Engineering

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Location: "C" Building  
Telephone: 902-494-3996  
Fax: 902-422-7535  
E-mail: E&CE@dal.ca

## Department Head

Nugent, S.T., BSc (Nfld), BEng (TUNS), MSc (Toronto), PhD (UNB).  
DSP of physiological signals, image processing.

## Professor Emeritus

Marble, A.E., BEng, MEng, PhD (TUNS), PEng

## Professors

Cada, M., MSc, PhD (Prague), PEng. Photonics, optical fibre communications, electro optical and all optical switching, multiple quantum well devices. Quantum-well lasers, nonlinear optical waveguide devices, multilayer structures, optical computing, optical image processing.  
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.  
El-Masry, E.I., BEng, MSc (Alexandria), PhD (Man), PEng. Analog microelectronics; analog integrated circuits (IC's) for high speed data transmission, low-voltage and low-power current-mode circuits for audio frequency, IF and RF signal processing, switched-capacitor circuits.  
Gregson, P.H., BEng, MEng, PhD (TUNS), PEng. Developing theory, algorithms and architectures for automated detection, localization and quantification of features in medical and industrial images.

## Associate Professor

Chen, Z., BEng (Fuzhou), MSc (Southeast), PhD (Ottawa), PEng  
Electromagnetic modelling and simulation, RF/microwave electronics, antennas, wireless communications and technology.  
Hughes, F.L., BSc (Carleton), MSc, PhD (Newcastle upon Tyne).  
Geographic routing (IPv6), renewable energy, embedded systems, software development tools, distributed systems.  
Little, T.A., BScEng (UNB), MEng (Memorial), PhD (UNB). Alternate energy generation, electric machines, energy storage systems.

## Assistant Professors

Ilow, J., BEng (Wroclaw, Poland), MSc, PhD (Toronto). Statistical communication theory and wireless networks.

## Adjunct Associate Professors

Stergiopoulos, S., BSc (Athens), MSc, PhD (York).

## 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 Engineering. The ease, speed and precision by which electrical energy and electrical signals can be transmitted, transformed and controlled has influenced not only the everyday life of people, but has also changed the class of many other disciplines. Over the short span of only a few decades, Electrical 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 Engineer. See the Engineering section for details of Masters and Doctoral programmes.

## II. Classes Offered

### ECED 6010.03: Linear System Theory.

The main thrust of the class is to introduce an algebraic unification of finite-dimensional linear systems with emphasis on continuous and discrete dynamic systems, using an operator theoretic approach. Topics covered include transition matrices, functions of matrices, adjoint systems, weighing patterns, realizability; canonical forms; stability, minimal realization; minimum norm, and approximation problems.

### ECED 6020.03: Non-Linear System Analysis.

A presentation of well developed techniques for analyzing non-linear systems, including phase-portrait method and the sinusoidal describing function and correlation concept. Liapunov's stability criterion is derived and applied to control system examples. Introduction to the analysis of statistical systems with Gaussian input describing functions. Application of digital simulation procedures are emphasized.

### 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, behavioural modeling and design of operational and transconductance ( $G_m$ ) amplifiers,  $G_m$ -C filters, advanced design techniques for switched-capacitor filters (including multiple-loop feedback structures), current conveyor'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 6110.03: Computer Methods in Power System Analysis.

Advanced topics in load flow analysis; Decoupled Load Flow, inclusion of High-Voltage direct current links in load flow. Parameter estimation for power systems. Static state estimation. Load modeling.

### 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 6140.03: Advanced Topics in Electrical Machinery.

Some of the following topics will be covered: dynamics of synchronous machines; hunting; asynchronous running; short circuit calculations with symmetric and asymmetric faults. Unbalanced operation of induction motors. Linear induction motors. Winding unbalance. Physical problems in electrical machines.

### 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 6210.03: Electronic Instrumentation.

This class concentrates on providing a firm grounding in the requirements for analog processing and interface subsystems as well as design fundamentals and performance limits for the major building blocks. Major topics covered include: Operational

Amplifier circuits and limitations, active filters, data acquisition systems, sampling processes and codes, transducers and signal conditioning.

### ECED 6220.03: Introduction to VLSI Systems.

This class uses the Mead Conway approach to introduce students to integrated circuit design. Topics covered include: devices and fabrication, IC technologies, layout of simple circuit elements, computer design aids, testing and testability, digital design considerations. Through the University's membership in the Canadian Microelectronics Corporation, students are given the opportunity to submit designs for fabrication.

### 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. PRE-REQUISITES: IC Design or by permission of instructor.

### ECED 6230.03: Advanced Topics in Electronic Systems Design.

This class is intended to give an overview of modern trends in the design of Microelectronic systems. Particular emphasis is placed on Computer aided Design tools for analysis, simulation, layout and interface to manufacturing. Other major areas include: semi-custom IC design (gates arrays, standard cells), data communication and automated testing.

### 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 6320.03: Microwave Radio Systems.

This class deals with both analog and digital microwave radio systems. Major topics include: Devices and circuits for microwave generation, amplification, frequency conversion, modulation and detection techniques, phase-locked loops, microwave propagation characteristics, design considerations of terrestrial and satellite communication systems, and interference problems in microwave radio systems.

### 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.

PRE-REQUISITES: 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 6340.03: Antenna Theory and Design.**

This class deals with the theory and design of antennas. Major topics include: Radiation from wire-type and operative-type antennas, antenna arrays, scanning antennae, signal processing antennae, ground effects on antennae characteristics, design considerations and measurements, and special topics in antenna systems.

### **ECED 6355.03: Laser Optics.**

This class begins with a review of quantum mechanics relevant to the development of the density matrix approach. This approach is used along with the pertinent electromagnetic theory to examine the issues that lead to laser oscillation. Topics discussed include: the density matrix, electromagnetic fields and their quantization, the 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 of fiber-optic components and systems. Major topics include: preview of fiber-optic communications, optic waveguides and fibers, light sources, modulation and detection techniques, optical wavelength functionalities, integrated optics and sensors, various applications.

### **ECED 6520.03: Signal Detection Theory.**

Classical detection theory (statistical decision theory), multiple hypotheses, composite hypotheses, sequential analysis. Classical estimation theory. Representation of random processes. Detection of signals (white noise, coloured noise, signals with unknown parameters). Estimation of signal parameters. Linear filtering theory, estimation of continuous waveforms, Wiener and Kalman filtering.

### **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 6540.03: Introduction to Adaptive Signal Processing.**

An introduction to adaptive signal processing is provided. The class begins with a brief review of linear signals and systems and Wiener filter theory. Next, linear prediction and lattice filter structures are presented. Adaptive transversal filters are introduced and the least-mean-square algorithm is discussed in detail. Recursive least-squares based adaptive filters and their implementation are covered in the remainder of the class. Assignments and projects are computer oriented.

### **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 6570.03: Digital Communications.**

The class is intended to introduce the student to the concepts and theory of digital communications. The concepts of information, channel capacity, error probability, intersymbol interference, pulse shaping and spectrum shaping and optimum filtering are discussed. Digital multiplexing and bit stuffing, encoding, scrambling, equalization and synchronization problems are studied. Regenerative repeaters, M-ary signaling systems, basic modulation techniques - ASK, PSK and FSK; and performance characteristics of digital transmission systems are considered.

### **ECED 6581.03: Digital Transmission Theory.**

The class covers the theory and techniques of modern carrier digital communications. The mathematical tools necessary to analyze and design transmission are reviewed. Classical results, as well as recent developments in modulation/demodulation and coding techniques for various channels and their performance evaluation are studied. Ideal AWGN, bandlimited, fading, and nonlinear channels are discussed.

### **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. PRE-REQUISITES: ECED 5530.03, ECED 5540.03 or equivalent

### **ECED 6610.03: Sampled Data Control Systems.**

Sampling a continuous signal; hardware; discrete time, signals and systems; numerical integration, difference equations; properties of linear discrete systems; Z-transforms, transfer functions; state space representations digital simulation.

### **ECED 6620.03: Optimal Control Systems.**

This class introduces three facets of optimal control-dynamic programming, Pontryagin's Minimum Principle 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 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 differentiation are treated. Decision theory, linear regression, linear programming applications are discussed.

**ECED 6720.03: Medical Instrumentation.**

A general survey of the quantities which are measured to describe the electrophysiological, biochemical, respiratory, and hemodynamic characteristics of the human patient. An in-depth study of the specifications of measurement equipment which can adequately transduce, condition, and record the dynamic events which are characteristic of both healthy and diseased physiological systems. A familiarity with state of the art diagnostic and therapeutic medical instrumentation as to its cost, accuracy, reliability, limitations, and safety.

**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.

**ECED 6910.03: Directed Studies in Electrical Engineering.**

This class is available to graduate students enrolled in a Master's Degree programme in Electrical 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 super fast optical signal processing devices, high-performance optical communications systems, and optical computers are addressed.

**ECED 7910.03: Directed Studies in Electrical Engineering II.**

This class is available to graduate students enrolled in a Ph.D. programme in Electrical 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

Location: Faculty of Computer Science Building  
6050 University Avenue  
HALIFAX, NS B3H 1W5  
Telephone: (902) 494-3702  
(902) 492-1517  
E-mail: mec@cs.dal.ca  
Website: www.ecomm.dal.ca

## Programme Director

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

## Programme Administrator

Patterson, K., BBA (MSVU)  
Telephone: (902) 494-3702

## Instructors

Bodorik, P., BSc (Calgary), MEng, PhD (Carleton)  
Deturbide, M., BSc (Dal), BJ (King's), LLB (Dal), LLM (Dal)  
Duffy, J., BS, MS, PhD (Iowa State)  
Gao, Q., MAsc, PhD (Waterloo)  
Hartzman, MSc (Toronto), PhD (Colorado)  
Kindred, H.M., LLB (Bristol), LLM (London), LLM (Illinois)  
Marche, S., BA (Royal Military College), MEd (Alberta), PhD (LSE)  
McNiven, J.D., BA, MA, PhD (Mich)  
Milios, E.E., Dipl Eng (National Technical University), Sm & EE,  
PhD (MIT)  
Rau-Chaplin, A., BA (York), MCS, PhD (Carleton)  
Rosson, P.J., Dip. MS (Salford), MA (Lancaster), PhD (Bath)  
Scassa, T., BCL, LLB (McGill), LLM, JSD (Mich.)  
Schellinck, D.A., BSc, MBA (Dal), PhD (Illinois)  
Silver, D.L., BSc (Acadia), CIM (SMU), MSc, PhD (ABD, Western)  
Slonim, J., BSc, MSc (Western), PhD (Kansas)  
Srinivas, BEng (Bangalore), PhD (Inst. Of Science, Bangalore)  
Watters, C.R., BSc, MSc, MLS (Western), PhD (TUNS)  
Zincir-Heywood, N., BSc, MSc, PhD (Ege)

## I. Introduction

The Faculty of Computer Science's Global Information Networking Institute, 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 programme consists of core classes, stream classes, a project, and an industrial internship. 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, Law and Policy.

The programme 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 programme 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 programme description, please see the Faculty of Computer Science entry in this calendar. Please visit the Electronic Commerce web site at <http://www.ecomm.dal.ca> for information concerning updates to the programme's regulations and class offerings. Email queries can be addressed to mec@cs.dal.ca.

## II. Admission Requirements

Students entering this programme will usually have completed a four-year bachelor's programme 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. Students whose background preparation is judged to be deficient, or who plan to pursue a stream for which they do not have an undergraduate level background, may be admitted conditionally subject to the successful completion of one or more prerequisite classes which will be specified at the time of admission.

The programme of study consists of the following:

### Core Classes

Core classes taken by all students include the following:

- ECMM 6000.03 Global of Electronic Commerce
- ECMM 6010.03 Electronic Commerce - Technology Core
- ECMM 6020.03 Electronic Commerce
- ECMM 6030.03 Policy Issues in Electronic Commerce

### Stream Classes

Approved stream classes include the following:

#### Technology Stream

- 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 xxxx.03 Graduate computer science elective - prerequisite: CS undergraduate core plus permission of instructor

#### Business Stream

- ECMM 6022.03 IT Project Management (required)
- ECMM 6024.03 New Venture Creation (required) - prerequisites: permission of instructor
- 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

#### Policy Stream

- LAWS 2019.03 Law and Technology (required)
- LAWS 2168.03 Internet and Media Law (required)
- LAWS 2130.03 International Trade Transactions
- LAWS 2159.03 Advanced Health Law

### Research Project

The research project is carried out under the supervision of a faculty member. It can be related to the internship, but it is academic in nature (for example business cause, survey, or a computer implementation). A written report and a presentation is expected on completion. Research projects will be conducted and evaluated under normal guidelines of the Faculty of Graduate Studies for masters' level projects. Students considering continuing onto 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 normal Faculty of Graduate Studies thesis guidelines.

### Industrial Internship

The internship is a job, within an organization related to electronic commerce, or electronic government. The employer agrees to ensure that the content of the job 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 for students. Students must have

completed at least three core classes and three stream classes (or have received special permission from the electronic commerce executive committee) before starting their internship.

### III. Classes Offered

#### **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.

CO-REQUISITES: ECMM 6010.03, BUSI 6520.03, LAWS 2019.03

#### **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.**

#### **ECMM 6020.03: Business Issues for Electronic Commerce.**

See class description for BUSI 6520.03. in the Business Administration section of this calendar.

#### **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.**

See class description for BUSI 6002.03 in the Business Administration section of this calendar.

#### **ECMM 6030.03: Issues in Law and Policy for Electronic Commerce.**

This class will provide students in the proposed Master of Electronic Commerce degree programme 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 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 broadcasters, newspapers and magazines and 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 7000.06: Industrial Internship.**

#### **ECMM 7050.06: Research Project.**

# Engineering

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Undergraduate and Associated Universities.  
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## Assistant Deans

Kipouros, G.J. DiplEng (Athens), MASc, PhD (Toronto), PEng  
Satish, M.G., BSc, BECivEng (My), MEng, PhD (Concordia), PEng,  
Student Affairs

## Administrative Assistant

Parker, F., BA (MSVU)

## Graduate Studies Administrator

Griffin-Hody, P., BA (King's)

## I. Introduction

Dalhousie University offers programmes leading to Master's and Doctoral degrees in various branches of Engineering, Applied Mathematics, Food Science and Naval Architecture and Marine Engineering. These graduate programmes are offered through the Faculty of Engineering in accordance with the regulations of the Faculty of Graduate Studies.

### A. Areas of Study

Graduate programmes are offered in Biological Engineering, Biomedical Engineering, Chemical Engineering, Civil Engineering, Electrical and Computer Engineering, Engineering Mathematics, Fisheries Engineering, Food Science, Industrial Engineering, Mechanical Engineering, Metallurgical Engineering and Mining Engineering, Naval Architecture and Marine Engineering, and Internetworking.

#### Biological Engineering

Programmes 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, pg. 53 for additional information.

#### Biomedical Engineering

The School of Biomedical Engineering is a partnership between the Faculties of Engineering and Medicine. The programme offered is the MASc. Research interests include: biomaterials, bioelectricity and biomagnetism, medical imaging, physiological modelling, and rehabilitation. Please refer to the departmental entry, pg. 60 for additional information.

#### Chemical Engineering

The Department graduate programme 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. Programmes offered are MEng, MASc, and PhD. Please refer to the departmental entry, pg. 76 for additional information.

#### Civil Engineering

Programmes 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, pg. 83 for additional information.

#### Electrical and Computer Engineering

Programmes 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, pg. 104 for additional information.

#### Engineering Mathematics

This is an interdisciplinary programme 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. Programmes offered are MSc and PhD. Please refer to the departmental entry, pg. 115 for additional information.

#### Fisheries Engineering

Programmes offered are MEng, MASc, and PhD in the following areas: fishing machinery, seafood processing, aquaculture, fishery systems analysis, instrumentation and controls. This is an interdisciplinary programme of the Faculty of Engineering, please contact the Graduate Studies Office for further information.

#### Food Science

Research studies are offered on a wide range of topics in food processing, food chemistry, food rheology, microstructure, food engineering and fats and oils. Special emphasis is placed on seafood preservation, storage and handling. Programmes offered are MSc and PhD. Please refer to the departmental entry, pg. 132 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. Programmes offered are MEng, MASc, and PhD. Please refer to the departmental entry, pg. 155 for additional information.

#### Internetworking

The full fee Internetworking programme 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, and a project. 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. Each student is expected to secure an internship to undertake an industrial based project. This is offered as an MEng programme. Please refer to the departmental entry, pg. 160 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. Programmes offered are MEng, MAsC, and PhD. Please refer to the departmental entry, pg. 173 for additional information.

### **Metallurgical Engineering**

Graduate studies at the Master's and Ph.D. levels are offered; students should apply for these programmes in the usual manner. Graduate studies at the Master's level are also offered as a co-operative, combined BEng. - MAsC. programme 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. Programmes offered are MEng, MAsC, and PhD. Please refer to the departmental entry, pg. 181 for additional information.

### **Mining Engineering**

The programme offers 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. Programmes offered are MEng, MAsC, and PhD. Please refer to the departmental entry, pg. 181 for additional information.

### **Naval Architecture and Marine Engineering**

The programme is to provide 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. Programmes offered are MEng, MAsC, and PhD. Please refer to the departmental entry, pg. 173 for additional information.

## **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 web site on the Internet.

Prospective students are encouraged to contact the appropriate department for programme 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 programme of study for the Master's degree may be either a research programme or a class work programme. A Master's degree taken according to either programme represents an equivalent standard of academic achievement. Note that a research Master's degree is normally required to gain admission into the Ph.D. programme.

### **G. Class Requirement**

At least three-quarters(75%) of the total class requirement must be taken at the University. The graduate student's programme submitted by the appropriate department and must be approved by the Engineering Graduate Studies Office. Class requirements are given under the programme 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 programme.

### **K. Procedures and Guidelines for Master's Theses and Projects**

1. The Department is to ensure that supervisors are assigned to students within eight months of a student's registration. The Department must submit the name of the supervisor to the Engineering Graduate Studies 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 programme of studies for classes taken prior to commencement of the programme requires the recommendation of the Department and approval of the Faculty of Engineering in advance of registration. Note that some classes from local universities have been given "blanket" approval. Students should contact their departmental Graduate Co-ordinator for details.
3. The Department is to appoint a Supervisory Committee, within eight months of the first registration, to be responsible for the Candidate's programme and thesis/project preparation. The membership of the Supervisory Committee is to be conveyed to Engineering Graduate Studies 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 at least four months prior to the formal submission of the thesis/project. On approval by the Graduate Studies 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 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 programme of studies have been met:

- (i) Class work completed;
- (ii) Supervisory committee approved;
- (iii) Thesis/project title approved; and
- (iv) 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 Graduate Studies and Research.
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 Graduate Studies Office of the approval of programmes and the approval of thesis titles.
9. The student is responsible to see that all members of the Supervisory Committee receive copies of the thesis to be defended at least two weeks prior to the examination.

### III. Master of Applied Science (MASc)

#### A. Admissions Requirements

A candidate to be considered to the Master of Applied Science research programme 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 recognized 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 programme.

#### B. Academic Regulations

##### Programme Requirements

An MASc graduate programme consists of not less than six half-credit classes or their equivalent and a thesis project selected upon the advice of the thesis supervisor. Not more than two senior level undergraduate classes may be taken as part of the six 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 programme 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 programme. 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 Programme would normally be twenty months. A student is required to register each session to maintain eligibility to continue a programme 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

#### A. Admission Requirements

A candidate to be considered for the Master of Engineering class work programme must have obtained an undergraduate degree in engineering or its equivalent with high scholastic standing from a recognized university.

#### B. Academic Requirements

##### Programme Requirements

The requirements for the class work Master of Engineering degree is ten half-credit classes. Undergraduate classes, in the area of a student's interest, not taken by the student for previous credit, may be included in the programme, subject to prior approval. Not more than two classes may be undergraduate credits.

A project is required as a part of the programme (one or two half-credits out of the required ten half-credits). Projects require the appointment of a supervisor and a supervisory committee.

Individual departments will assess applicants and select students for the programme in their respective departments. Students' programmes will be determined by the department in which the student is registered. All programmes must have the approval of the department.

Entrance to the Master of Engineering Degree Programme in Naval Architecture and Marine Engineering may be through one of two categories. For students who are graduates of an undergraduate degree programme 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 ten half-credits, eight half credit classes and a one full credit project, the same credit requirements as other Master of Engineering Degree Programmes.

Candidates who are graduates of an undergraduate programme 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 postgraduate 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 programme 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 programme. Failure to achieve the minimum mark as noted above shall be considered grounds for dismissal.

##### Time Requirement

The minimum time requirement for completing the programme is twelve months. A student is required to register each session to maintain eligibility to continue his/her programme of studies. See Faculty of Graduate Studies Regulations for policies regarding the maximum length of time for degree completion and extensions.

## V. Master of Applied Science/Master of Urban and Rural Planning; Master of Engineering/Master of Urban and Rural Planning

The Department of Urban and Rural Planning (Faculty of Architecture), in co-operation with the Department of Civil Engineering (Faculty of Engineering), offers two joint degrees in water resources engineering and planning (MEng/MURP) and MASc/MURP). (A "joint" degree is defined as one where a single parchment is awarded, containing the names of both degrees.)

### A. Admission Requirements

(a) MEng/MURP: a candidate, to be considered for the MEng/MURP programme, must have obtained an undergraduate degree in engineering with a high scholastic standing from a recognized university.

(B) MASc/MURP: 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/MURP Programme Requirements

To receive the joint MASc/MURP degree a student must:

1. Satisfy all mandatory class requirements for the MURP programme;
2. Satisfy all elective class requirements, as approved jointly by the Department of Urban and Rural Planning and the Department of Civil Engineering;
3. Complete and defend a thesis guided by a thesis committee consisting of at least one instructor from the Department of Civil Engineering and one instructor from the Department of Urban and Rural Planning. The thesis must be accepted by the thesis committee and an external examiner approved by the two departments.
4. This degree is subject to the overall regulations of the Faculty of Engineering.

#### MASc/MURP Programme Requirements

To receive the joint MASc/MURP degree a student must:

1. Satisfy all MURP 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 Department of Urban and Rural Planning and the Department of Civil Engineering, from the following list of classes (in preference to classes listed as electives under the MURP programme) eight or nine 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 a thesis of one or two full credits, under the guidance of an Examining Supervisory Committee that meets University regulations.
4. This degree is subject to the overall regulations of the Faculty of Engineering.

Note: Classes taken under Item 2 above must total 18 half-credits for the MEng/MURP or 6 half-credits for the MASc/MURP.

### 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 programme, credit may be given for those classes. It is unlikely that advance class credit will shorten attendance below two years.

The programme is organized as follows:

Fall Term	Winter Term	Summer Term
P1 (Study)	P2 (Study)	P3 (Work Period)
P3 (Study)	P4 (Study)	

## VI. Master of Science (Engineering Mathematics)

### A. Admission Requirements

For admission into the Master of Science programme 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 Programme 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 Programme will be considered a prerequisite to admission to the Master of Science programme.

### B. Academic Regulations

#### Programme Requirements

##### Thesis Option

A candidate will be required to submit a proposed class of study, to be approved by the Department and the Faculty of Graduate Studies.

The programme will consist of at least 6 half-credit classes and a thesis related to the proposed class of study (equivalent to two full credits). The class requirement will consist of 6 classes, at least four of which shall be graduate classes offered by the Department of Applied Mathematics. Not more than two classes 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 programme 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 programme. 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 normally require at least twelve months to complete the degree. A student is required to register each session to maintain eligibility to continue his/her programme of studies. See Faculty of Graduate Studies Regulations for policies regarding the maximum length of time for degree completion and extensions.

## VII. Master of Engineering (Internetworking)

### A. Admission Requirements

A candidate to be considered for the Master of Engineering in Internetworking programme 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

#### Programme 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.

A project is required in addition to the ten classes. It is preferred that the students go on a three to four month internship to undertake an industrial project. The project report will be examined by a committee consisting of the programme director, or designate, and up to two other professors or industrial examiners.

The programme director or designates will assess applicants and select students for the limited number of seats available in the programme. The programme of study of each student will consist of the ten programme classes in the approved sequence, and a project.

#### Examination Requirements

The ten programme 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 programme. 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. 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.

## VIII. Master of Science (Food Science)

### A. Admission Requirements

For admission into the Master of Science Programme in Food Science, students must have a BSc degree from any recognized university in any of the following disciplines:

- Food Science;
- Dairy Science;
- Chemistry/Biochemistry;
- Microbiology;
- Nutrition or Home Economics with suitable background; or
- Bachelor of Engineering

Students will be considered for the programme 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 programme. All candidates must meet the minimum admission requirements for the Faculty of Graduate Studies.

### B. Academic Regulations

#### Programme Requirements

The graduate programme consists of not less than six half-credit classes (or their equivalent) and a thesis is selected upon the advice of the thesis supervisor. The graduate student's programme is submitted by the Department of Food Science and Technology for review by Faculty of Engineering Graduate Studies. A minimum of ten half-credits or equivalent is required for the Master's degree.

#### 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 programme. 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 programme. 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 programme of studies. See Faculty of Graduate Studies Regulations for policies regarding the maximum length of time for degree completion and extensions.

## IX. Doctor of Philosophy

### A. Admission Requirements and Procedures

A candidate to be considered for entrance into the PhD programme 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 recognized engineering school, or a Master of Science Degree or its equivalent from a recognized university, acceptable to the Faculty of Engineering (in which case, a candidate may be required to take extra subjects to give him 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. The recommendation will be reviewed by the Faculty of Engineering Graduate Studies Committee.

An application for admission to the graduate programme 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 programme 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 programmes are developed under the regulations and procedures of the Faculty of Graduate Studies (see Faculty of Graduate Studies Regulations in this Calendar) and each programme must be approved by the Faculty.

#### Class Requirements

Doctoral programmes in Engineering normally require a minimum of six classes (i.e. Six half-credits) plus a thesis. No undergraduate classes are allowed for credit in a Doctoral Degree programme.

### 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 take not less than six classes (i.e. six half-credits). These classes will normally be selected in consultation with the research supervisor and supervisory committee, and must be approved by the Faculty of Graduate Studies.

### Thesis Requirement

A candidate will be required, as a major part of the programme, 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 programme. 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 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 programme. Failure to achieve the minimum mark as noted above shall be considered grounds for dismissal.

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.

### 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 programme 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 programme of studies for classes taken prior to commencement of the programme 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 programme 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 least 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 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 may include 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 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 programme 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 Department will submit the names of the Examining Committee members to the Graduate Studies Committee for approval. 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 Faculty of Graduate Studies in accordance with Faculty of Graduate Studies procedures. The External Examiner will be approached and appointed by the Faculty according to Faculty procedures.
7. Copies of the thesis must be submitted to the Engineering Graduate Studies 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 Graduate Studies Office. The copies must be accompanied by the appropriate form. The Graduate Studies Office will co-ordinate the scheduling of the presentation and examination according to Faculty procedures. It is the student's responsibility to ensure that all members of the examining committee have been given clean copies of the thesis the same time as his/her submission to the Engineering Graduate Studies office. The oral presentation and examination will not be scheduled until the following requirements for the student's programme of studies have been met:
  - (i) Class work completed;
  - (ii) Thesis title approved;
  - (iii) Examining Committee established;
  - (iv) Comprehensive examination passed;

- (v) A written report has been received by the Graduate Studies Office from an external examiner with a recommendation that the thesis proceed to defence.
8. The thesis is to be prepared to conform with the standards of the Manual for the Preparation of Graduate Theses, available at the Office of Graduate Studies, Faculty of Engineering.
  9. 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.
  10. The student shall be advised by the Engineering Graduate Studies Office of the approval of programmes, the results of comprehensive examinations, and the approvals of the thesis title and committees.

#### **Award of Degree**

A candidate will not be awarded the PhD degree unless they have satisfied all the foregoing requirements.

## **IX. 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 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; conceptual 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

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Location: 1340 Barrington St.  
Halifax, NS  
Telephone: 902-494-6085  
Fax: 902-423-1801  
E-mail: louise@is.dal.ca

## Department Head

Phillips, W.J., BSc(Eng), MSc (Qu), PhD (UBC). Digital Signal Processing algorithms and implementations

## 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.

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 Professors

Dupuis, D.J., BSc (Moncton), MSc (Queen's), PhD (UNB). Robust statistics, analysis of extreme values.

Kember, G., BSc, MSc, PhD(UWO). Dynamical systems and the analysis of geophysical and medical time series data.

## Killam Postdoctoral Fellow

Iakovlev, S.V., MSc, PhD (St. Petersburg). Fluid-structure interaction.

## Adjunct Professors

Chehil, O.S., MS (Panj.I), MTech (Kharagpur), PhD (McGill).  
Sarwal, S.N., BA, MA (Punji)

## Assistant Adjunct Professor

Sivakumar, S., MSc, PhD (TUNS)

## I. Introduction

The Department of Engineering Mathematics offers programmes leading to MSc and PhD degrees in Engineering Mathematics.

The programme 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 programme is designed for students who have already completed an undergraduate programme in Mathematics, Physics, Computer Science, or Engineering. See section on Engineering for general programme regulations.

## II. Classes Offered

### 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.

PRE-REQUISITES: ENGM 3311.03, ENGM 3322.03

### ENGM 6613.03: Methods of Applied Mathematics.

Linear partial differential equations. Derivation of classical equations, classification and boundary condition, separation of variable technique, integral transform method of solving partial differential equations.

PRE-REQUISITES: ENGM6612

### ENGM 6615.03 Perturbation Techniques.

Introduction. Parametric perturbation. The method of strained coordinates, Lighthill and Temple's techniques, matched and composite asymptotic expansions. Multiple scale methods, asymptotic solution of linear equations.

### 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 Lebesgue 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 thin 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 programmes 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 unsymmetric eigenvalue problems, and iterative

methods. The student is expected to code most of the algorithms on the computer.

PREREQUISITES: Ability to programme in C or Fortran.

### **ENGM 6658.03: Numerical Solution of Differential Equations.**

This class begin with a study of solution techniques of 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 programmes.

PRE-REQUISITES: Ability to programme 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.

Prerequisites: 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.

PRE-REQUISITES: 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; Bernoulli'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.

PRE-REQUISITES: 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.

PRE-REQUISITES: 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-REQUISITES:** 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.

**PRE-REQUISITES:** A working knowledge of basic probability theory and some statistics

### **ENGM 9000.00: Master's Thesis.**

ENGM 9530.00: PhD Thesis.

## English

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e-mail: GRADENGL@IS.DAL.CA  
Website: <http://www.dal.ca/~englwww/englwww.html>

### **Chairperson of Department**

McNeil, D.

### **Professors Emeriti**

Fraser, J., MA (Oxon), PhD (Minn), FRSC  
Gray, J., MA (Aberd), MA (Oxon), PhD (Mont), FRSA, FRSC, McCulloch Professor of English  
Ross, M., OC, BA (UNB), MA (Toronto), PhD (Corn), DLitt (UNB), LLD (St.Thom), LLD (Dal), LLD (Queen's), DLitt (Trent), DLitt (Edinburgh), DLitt (Windsor), DSL (Trinity College), DLitt (Acadia), LLD (StFX), DLitt (UWO), FRSC  
Sprott, S.E., MA, BD (Melbourne), PhD (Columbia)

### **Professors**

Andrews, A., BA, DipEd, MA (Leeds), PhD (Ill), FRSA, major appointment in Theatre  
Baxter, J.R., BA, BEd, MA, PhD (Alta). Renaissance literature.  
Furrow, M.M., BA (Dal), MA, MPhil, PhD (Yale). Medieval literature.  
Huebert, R.M., BA (Sask), MA, PhD (Pitt). Renaissance literature.  
Monk, P., BA (Reading), MA (Carleton), PhD (Queen's). Canadian literature.  
Tetreault, R.R., BA (UBC), MA, PhD (Cornell). Romantic literature.  
Wainwright, J.A., BA (Toronto), MA, PhD (Dal). Canadian literature.

### **Associate Professors**

Diepeveen, L., BA (Calvin), MA, PhD (Ill). Modern American literature.  
Greenfield, B.R., BA (York), MA (McGill), MPhil, PhD (Columbia). Colonial and nineteenth-century American literature.  
Li, V., BA, MA (UBC), PhD (Cantab). Literary theory and modern literature.  
Luckyj, C., BA, MA, PhD (Toronto). Renaissance literature.  
Maitzen, R., BA (UBC), MA, PhD (Cornell). Nineteenth-century literature.  
McNeil, D., BA (Concordia), MA (UNB), PhD (McMaster); Chair of Department. Restoration and eighteenth-century literature.  
Ross, T., BA, MA (Carleton), PhD (Toronto). Eighteenth-century literature and history of criticism.  
Stone, M., BA (Guelph), MA, MPhil (Waterloo), PhD (Toronto). Feminism and victorian literature.  
Thompson, J., BA (Western), MA, PhD (Toronto). Romantic literature.

### **Assistant Professors**

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  
Morgan, H.E., BA (UBC), MA (Wash), BLitt (Oxon), PhD (Wash). Old English.  
Stewart, A., BA (Guelph), MA, PhD (Queen's). Twentieth-century literature.

### **Adjunct Professors**

Bruhm, S., MA (Dal), PhD (McGill); Mount Saint Vincent University  
Davies, G., BA (Dal), MA (Toronto), PhD (York); Acadia University  
Davies, R., PhD (Wales); Acadia University

Drain, S., BA (Trent), MA (Leicester), PhD (London); Mount Saint Vincent University  
 Edwards, E., BA, MA (Dal), PhD (Cambridge); University of King's College  
 Esonwanne, U., BA (Nigeria), MA, PhD (UNB); Saint Mary's University  
 Ferns, C., BA, PhD (London); Mount Saint Vincent University  
 Glowacka, D., MA (Wroclaw), PhD (SUNY); University of King's College  
 Hill, J., BA (Sheffield), MA, PhD (Dal); 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  
 Manos, K., BA (Alta), MA (Calgary), PhD (Dal); Nova Scotia College of Art and Design  
 Monaghan, D., BA, MPhil (Leeds), PhD (Alta); Mount Saint Vincent University  
 Perkin, J.R., BA (Oxford), PhD (Toronto); Saint Mary's University  
 Schwenger, P., PhD (Yale); Mount Saint Vincent University  
 Smith, D., BA (Man), MA (Carleton), PhD (Man); St. Francis Xavier University  
 Smol, A., BA (Concordia), MA, PhD (Queen's); Mount Saint Vincent University  
 Whalen, T., MA (Melbourne), PhD (SMU); Saint Mary's University

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 at least in the last two years. Both MA and PhD programmes 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 programme 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.

The Department suggests a pragmatic deadline much earlier than the official one. We urge applicants to complete their applications by late January to allow the Department to put forward the best candidates for Killam awards.

## II. Degree Programmes

### A. Master of Arts (MA)

For minimum time required to complete this programme, see Section 1.3.1 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 three full-year classes. With the approval of the Department, a graduate class in another department relevant to the candidate's class 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.

All students are required to have studied at least one European language other than English and to demonstrate some proficiency in it.

A thesis, equivalent to two classes, is required.

### B. Doctor of Philosophy (PhD)

For a minimum time required to complete this programme, see Section 1.3.2 in the Faculty of Graduate Studies regulations.

In the first year, doctoral candidates must take graduate seminars in the pattern described above for the MA.

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 programme.

All graduate students in the Department are required to have studied at least one European language other than English, and to demonstrate some proficiency in it.

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.

## III. Classes Offered

### Graduate Seminars

Approximately seven full-year seminars or the equivalent are offered each year. Students should consult the Department 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.

INSTRUCTORS: M. Furrow, H. Morgan.

#### ENGL 5120X/Y.06: Early English Plays.

A survey of the native English dramatic tradition, from liturgical plays, through guild drama, moralities, and saints' plays, to the drama of Marlowe and contemporaries.

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: A. Higgins

**ENGL 5125.03: The Social Context of Guild Drama.**

A study of cultural production in the late Middle Ages, focused on the plays owned and produced by trade guilds in English towns.  
INSTRUCTOR: A. Higgins

**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: A. Smol

**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: A. Smol

**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: J. Baxter

**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: J. Baxter

**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: J. Baxter

**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: J. Baxter

**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: C. Luckyj

**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: R. Huebert

**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: R. Huebert

**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: R. Huebert

**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: C. Luckyj

**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: C. Luckyj

**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: D. McNeil

**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: D. McNeil

### **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: D. McNeil

### **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). Students should consult the supplement for a detailed description.

INSTRUCTOR: D. McNeil

### **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: T. Ross

### **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: D. McNeil

### **ENGL 5405X/Y.06: The Wordsworths 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 labour' at work in the production of texts by Coleridge and the two Wordsworths (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: J. Thompson

### **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: R. Tetreault

### **ENGL 5411.03/5412X/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: R. Tetreault

### **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: M. Stone

### **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: J. Thompson

### **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: R. Tetreault

### **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: M. Stone

### **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: J. Thompson

### **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: R. Tetreault

### **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: R. Tetreault

### **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: R. Tetreault

**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: M. Stone

**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: R. Maitzen

**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: R. Maitzen

**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: R. Perkin

**ENGL 5545.03: George Orwell and the Politics of the Plain Style.**

This class has three primary objectives: 1) to introduce students to the breadth of this well-known author’s work, 2) to discuss problems inherent in a “plain style” presentation, and 3) to branch out into broader considerations of Orwell’s literary and political contributions.

INSTRUCTOR: A. Stewart

**ENGL 5560.03: The Movement Poets.**

This class examines The Movement as a cultural and a literary tradition, and explores the work of central figures associated with its name primarily because of their inclusion in given anthologies (e.g. Elizabeth Jennings, Philip Larkin, Thom Gunn, Kingsley Amis, Donald Davie, and Ted Hughes). The Movement anthologies and the politics of anthology production will be examined in some detail.

INSTRUCTOR: T. Whalen

**ENGL 5615X/Y.06: 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.

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: P. Monk

**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: J.A. Wainwright

**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: P. Monk

**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: J.A. Wainwright

**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 has reinscribed the Canadian cultural landscape and so redefined the politics of cultural experience in Canada.

INSTRUCTOR: J.A. Wainwright

**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: B. Greenfield

**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: B. Greenfield

**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: B. Greenfield

**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: A. Stewart

**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: L. Diepeveen

**ENGL 5835.03: Finding a Centre: 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: L. Diepeveen

### **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: L. Diepeveen

### **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: L. Diepeveen

### **ENGL 5875.03: Twentieth Century African American Intellectual Debate.**

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: A. Stewart

### **ENGL 5906.03: Problems in Literary History.**

Literary historians believe that texts ought to be interpreted in relation to their historical contexts, and that a study of this relation provides a fuller understanding and appreciation of those texts than is otherwise possible. This seminar examines the theoretical principles of literary history as proposed by some representative twentieth-century critics, from the old historicists to the new.

Topics might include periodization, genre and generic change, the anxiety of influence, feminist literary history, reception aesthetics, the sociology of literary production, literary history and disciplinarity, and the problem of mediation.

INSTRUCTOR: T. Ross

### **ENGL 5917.03: Critical Theory: The Ethical Turn.**

Under fire for a lack of commitment in the 1980's, critical theory (postmodernism, post structuralism, and deconstruction) takes an 'ethical turn' in 1990's 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: D. Glowacka

### **ENGL 5918.03: The Politics of Representation.**

This class will examine literary works as politically or ideologically charged representations of complex, historically situated events and experiences. We will focus our attention not only on Western representations of non-Western others but also on non-Western resistance to such representations.

INSTRUCTOR: V. Li

### **ENGL 5922.03: Neo-Primitivism in Contemporary Discourses.**

This class will examine critically the continuing Western fascination with the "primitive" in fiction, films, philosophical writings, literary criticism, art exhibitions, and counter-cultural lifestyles.

INSTRUCTOR: V. Li

### **ENGL 5923.03: Subjectivity in Colonial and Anti-Colonial Discourse: The Adventures of a Concept in Twentieth-Century Fiction and Theory.**

What (and who) is a colonial subject? How have twentieth-century intellectuals conceived of subjectivity in colonial formations? By what processes are the colonized constituted as the "Other"

("native") in, or as subjects of, discourse? How have writers represented, and negotiated representations, of the colonized, and in what ways could these negotiations be seen as refractions of the material conditions of existence in specific colonial formations? Such are the questions this class addresses.

INSTRUCTOR: U. Esonwanne

### **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.

INSTRUCTORS: J. Thompson, M. Stone

### **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: T. Ross

### **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.

NOTE: Students taking ENGL 5940 must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

INSTRUCTOR: S. Bruhm

### **ENGL 5945.03: Representations of Slavery: Race, Writing and Gender.**

This class focuses on narratives of and about slavery written over 3 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: M. Stone

### **ENGL 5965.03: The Book and the Reader.**

The immaterial experience of fiction always arises out of a material text. The negotiation between the book as a physical object and what the reader makes of it is here studied primarily through phenomenology and psychoanalysis.

INSTRUCTOR: P. Schwenger

### **ENGL 5995.03: Freud and Fiction.**

This class will study writings by Freud that have implications for the psychology of literature; literary works about Freud; and critical essays that extend Freud's ideas.

INSTRUCTOR: P. Schwenger

**ENGL 9000.00: MA Thesis.**

**ENGL 9530.00: PhD Thesis.**

# Environmental Studies

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Location: 1312 Robie Street  
Halifax, NS B3H 3E2  
Telephone: (902) 494-3632  
Fax: (902) 494-3728

## Resource and Environmental Studies

### Director of School

Duinker, P., BScAgr (Guelph), MES (Dal), PhD (UNB)

### Academic Programme Co-ordinator

Wood, K.S., BA, MA (Oregon)

### Professors

- Apostle, R., BA (SFU), MA, PhD (Calif, Berkeley), major appointment in Sociology and Social Anthropology. Fisheries social science; comparative analysis of small-scale fisheries
- Binkley, M., BA, MA, PhD (Toronto). Maritime Anthropology; Coastal communities; Anthropology of Tourism; Women and Work; Qualitative and Quantitative Research Methods.
- 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
- Freedman, B., BSc, MSc, PhD (Toronto), major appointment in Biology. Ecological effects of pollution, disturbance & other stressors, including: effects of forest harvesting on vegetation, wildlife & site quality, design of ecologically sustainable resource-use systems, development of material in support of environmental education.
- McAllister, I., MA (Oxon), MA (Cantab), major appointment in Economics. Disaster prevention, relief and sustainable post-crisis development policy options with particular focus on the International Red Cross and partner institutions; comparative policy experiences regarding international and domestic regional development of Canada and the European Market.
- Renton, K.W., BSc (Sir Geo. Wms.), PhD (McGill), major appointment in Pharmacology. Infection & drug disposition; biochemical monitoring of marine pollution; drug use in renal transplantation.
- Ricketts, P.J., BA (Nottingham), PhD (Southampton). Coastal zone management; GIS applications in coastal & ocean management, strategic environmental assessment.
- 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.
- Wood, K.S., BA, MA (Oregon). Environmental/ecological economics; resource systems & economic instruments for environmental management, environmental education

### Associate Professors

- Brown, M.P., BA (MtA), MA (Dal), PhD (Toronto) major appointment in Public Administration). Environmental policy & administration; dimensions of provincial environmental spending; forestry & land use; environmental industry in Canada
- 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
- Newkirk, G.E., PhD (Duke), major appointment in Biology. Community-based coastal resource management in developing countries; integration of fisheries & aquaculture as a food production system.
- Patton, D.J., BA (UNB), MA (Toronto), DBA (Indiana), major appointment in Business Administration. Exporting success-small to medium sized firms; international trade problems in the fishery.
- VanderZwaag, D., BA (Calvin), MDiv (Princeton), JD (Arkansas), LLM (Dal), joint appointment with Law. Environmental law reform, Canadian ocean law and policy, Arctic marine transportation.

### Assistant Professors

- Beazley, K.F., (Academic programme Coordinator) Biodiversity conservation, protected area systems planning and management, conservation biology and landscape ecology, environmental philosophy /ethics.
- Doyle-Bedwell, P., BA, LLB (Dal) Aboriginal women and justice, environmental issues and aboriginal interests in land, mi'kmaq people and health.
- Guernsey, J.R., BSc (Carleton), MSc, PhD (Iowa), cross appointment in Community Health and Epidemiology. Human risk assessment, global and local intervention strategies which promote ecosystem health, environmental epidemiology, exposure assessment methodologies.
- Guppy, S., Cross-appointment with School of Urban and Rural Planning, Faculty of Architecture, BSc (Nottingham), MSc, PhD (Wales), MArch (Columbia), DalTech.
- Hood, R.D., BPE (Calgary), MSc, PhD (Illinois). Recreation/leisure and health, health promotion.
- Saunders, P., BA, MA, LLB (Dal), major appointment in Law. Canadian environmental law, international law, law and development assistance, law of the sea, ecosystem protected area management/monitoring.

### Research Associates

- Barchard, W., BSc, MSc (Guelph), Environment Canada
- Beach, H., BA (Hons) (Simon Fraser), MSc (McGill), Department of Canadian Heritage
- Buckley, D.E., BSc (Acadia), MSc (Western), PhD (Alaska), BIO
- Campbell, J.M., BA (Dal), MA, PhD (UC Irvine)
- Chute, J., BA (Dal), MA (MUN), MA (Toronto), PhD (McMaster)
- Howell, G., BSc, MSc (Dal), Environment Canada
- Johannesen, H., BA (SMU), MA (SMU), Management Consultant
- LeBlanc, P., Diploma American Management Institute, Rotnem Consulting
- Mitchell, L., BA (Acadia), LLB (Dal), MES (Dal)
- Muecke, A., Griffiths Muecke Associates
- Monk, K.A., BSc (Durham), PhD (London)
- Niles, B., BA (Alberta), MA (Dal)

### Adjunct Professors

- Beanlands, G., E.E., BSc (UNB), PhD (Dal) Environmental impact assessment, computer applications in environmental management, education and training in environmental management.
- Beesley, K.B., BES, PhD (Waterloo), Nova Scotia Agricultural College
- Bondrup-Nielsen, S., BSc (Guelph), MSc (Toronto), PhD (Alta), Acadia University
- Charles, A.T., BSc (Carleton), PhD (UBC), Saint Mary's University
- Cossey, K., MES (York), Heritage Canada
- Daborn, G., BA (Keele), MSc, PhD (Alta), Acadia University
- Duerden, C., BSc, PhD (Dal), Duerden & Keane Consultants Inc.
- Gordon, R.J., BSc, MSc (McGill), PhD (Guelph), Nova Scotia Agricultural College
- Grant, J., MA, PhD (Waterloo), Nova Scotia College of Art & Design

Hall, H., BSc (Alberta), MSc (Calgary), Anchorage Environmental Consultants  
 Herman, T., MSc, PhD (Alta), Acadia University  
 Hildebrand, L., BScH, MES (Dal)  
 Keane, S., BSc (StFX), MEng (Western Ontario), Duerden & Keane Consultants Inc.  
 Martin, R., BA (Carleton), MSc (Carleton), PhD (McGill), Nova Scotia Agricultural College  
 Moore, C., BSc (Guelph), MSc (Concordia), CanTox Environmental Inc.  
 Mueke, G., BSc, MSc (Alberta), DPhil (Oxford), Honourary Professor, Earth Sciences, Dalhousie University  
 Munro, N., BSc (UNB), MA (Carleton), Parks Canada  
 Pinter, J., MSc (Eotvos), PhD (Moscow State), DalTech  
 Scarratt, D.J., BSc, PhD (Wales), Bedford Institute of Oceanography  
 Taylor, I., BA (Leeds), MA (Toronto), PhD (Liverpool), Environment Canada  
 Vasseur, L., BSc (Sherbrooke), MSc (Quebec), PhD (Queen's)  
 Vigerstad, T., MSc, PhD (Rhode Island), Bio-Response Systems Limited  
 Waller, D.H., PhD (Dal), DIC (Public Health) (London), BEng (TUNS), DalTech  
 Warner, A., BSc (Brown's), MA (Dal), BEd, PhD (Dal)  
 Wells, P.G., BSc (McGill), MSc (Toronto), PhD (Guelph), Environment Canada  
 Yiridoe, E., BSc (Univ Science & Tech Ghana), MSc, PhD (Guelph)

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. It offers a two year Master's programme leading to the Master of Environmental Studies (MES) degree which includes class work and a thesis.

At the core of the School is an interdisciplinary teaching and research programme 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. Students take core classes from which they will acquire a broad, interdisciplinary background in environmental studies. There are opportunities for study and research from the points of view of policy, technique and science.

In addition to working partnerships within the Faculty of Management, SRES contributes to many other programmes and institutes on the Dalhousie campus, including the Marine Affairs Programme and the Lester Pearson Institute for International Development. 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.

The core faculty of the School is complemented by cross-appointed faculty whose major appointments are in other units within Dalhousie, at other universities or in government agencies.

## I. Admission Requirements

As established by the Faculty of Graduate Studies, the entrance requirement is an Honours Bachelor Degree or the equivalent of honours with at least a B average (3.0 GPA) from a university recognized 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. Students with a professional degree in law, architecture, medicine or engineering with a concentration in environmental studies, may be considered for the one-year programme.

**Deadline for application is February 15.**

## II. Programme Duration and Minimum Requirements

For most students, the minimum programme will occupy two calendar years. In addition to the thesis requirement, 11 half-credit classes are required. The programme is designed to broaden a

student's perspective on natural resource and environmental issues. Therefore, students whose specialization is in the natural sciences must take at least two classes in the social sciences and vice versa. All students take classes in environmental studies, environmental assessment, environmental economics and environmental law, as well as classes in their particular area of specialization. Class work beyond the minimum load may be required and is specified by the Programme Coordinator after discussion with the student and his/her academic advisors.

Students will generally complete the following requirements:

### Required Classes:

- ENVI 5000X/Y.06 Introduction to Environmental Studies (two half credits) -- a seminar class taken during the first year of study
- ENVI 5001.03 Environmental Impact Assessment  
Usually taken in first year
- ENVI 5002.03 Joint Project  
This class is intended to provide students with skills and experience in working on a complex issue as a team. The School intends to broaden the definition of this to include community outreach.
- A class in environmental economics. Suitable classes include:
  - ENVI 5110.03/ECON 5516: Resource Economics
  - ENVI 5111/ECON 3332: Resource Economics
  - ECON 5250X/Y.06 (two half credits): Development Economics
  - ENVI 5031.03: Environmental/Ecological Economics
  - ENVI 5020.03: Resource Systems and Economic Development
- A class in resource or environmental law. Suitable classes include:
  - ENVI 5200.03/LAWS 2104: Environmental Law
  - LAWS 2020.03: Fisheries Law
  - LAWS 2051.03: International Environmental Law
  - LAWS 2015.03: Land Use Planning

Few students will have background training in law and students are urged to check with the professor about prerequisites and assessment for law classes.

### Elective Classes

Students are required to complete five additional classes, three of which are considered "broadening classes" and two of which are considered "specializing classes".

**"Broadening" Classes** - Students are admitted to the MES programme from different academic backgrounds, and all are encouraged to learn about approaches to understanding environmental issues within a range of disciplines. For students with a background in social sciences, two of these classes should be in natural or physical sciences and one should be chosen from the social sciences. Similarly, for students whose training has been in science or engineering, two classes should be social classes and one should be in the natural or physical sciences. "Broadening" classes may be taken at graduate or at senior undergraduate level. These classes should be in different disciplines, which are other than the student's undergraduate major. Some students come to the programme having studied several subjects in depth, or with backgrounds in subjects such as geography or economics which do not immediately fall into the classifications above. These students and their advisors should keep in mind the intention of this requirement when planning their programmes.

**"Specializing" Classes** - Two half credit graduate classes which help the student to gain depth and specific knowledge directly relevant to the student's overall interest and thesis area. Any graduate offering can be considered.

It is very strongly recommended that all students take the class in Research Methods (ENVI 5035.03) in their first semester, in preparation for developing a thesis proposal. All students are also encouraged to take at least one class with a strong comparative international content. This requirement can be accommodated within the overall programme requirements. Suitable classes include:

- ECON 5252.03: From Disaster Relief to Development
- ENVI 5020.03: Resource Systems and Economic Development

- ENVI 5818.03/BUSI 6813.03: Management and the Natural Environment - an International Perspective
- LAWS 2051.03: International Environment Law

In exceptional cases, a student may be admitted to a one-year programme. The requirements for a one-year programme are:

1. ENVI 5000.06 and 5001.03
2. Two graduate level classes related to an environmental theme in the student's area of specialization.
3. ENVI 9000.00 (Thesis)

### III. Classes Offered

All classes except ENVI 5002.03 and ENVI 9000.00 are open to students in other programmes by permission of the instructor. Please note that not all classes are offered each year, class content may also vary from year to year. Classes marked with an asterisk (\*) are offered in alternate years.

#### ENVI 5000X/Y.06: Introduction to Environmental Studies.

The first term focuses on the interdisciplinary nature of environmental studies. It begins by exploring broad issues of how people (including ourselves) view our place in nature and then turns to a series of topics currently at the centre of interest in Environmental Studies. These topics, which vary from year to year, may include global population and consumption issues, biodiversity conservation, climate change, sustainability, and pollution. The second term focuses more explicitly on resource management in various sectors such as forestry and mining, as well as roles of native peoples and non-governmental organizations.

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: K. Beazley

#### ENVI 5001.03: Environmental Assessment.

This class provides an opportunity for the students to explore all aspects of environmental impact assessment (EIA) as practiced in Canada and in other countries. The class traces the development of EIA over the past 20 years and critically examines the scientific, procedural and political dimensions. Over this period, EIA has become an integral part of project approval in government, the private sector and development agencies.

INSTRUCTOR: 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:

- Taking Responsibility for Water Quality in the Bras d'Or Lakes (1998)
- An Ecological Assessment of the Musquodoboit Trail. A Joint Project with the Musquodoboit Trailway Association (1998)
- McNabs, the Learning Island: A Proposal for an Outdoor Education Centre (1997)
- Folkestone Marine Reserve, Barbados (1998)
- Biological Diversity Plots in Fundy National Park (1997)
- Developing a Framework to Incorporate Traditional and Ecological Knowledge in Nunavut (1996)

Under exceptional circumstances, joint projects have also been undertaken in the Philippines, Indonesia and Nunavut.

#### ENVI 5004.03: Management of Chemicals & Wastes.

The fear of exposure to chemicals of undetermined toxicity in food, water, air and the workplace is a major public issue. Lack of knowledge about persistence, toxicity, production and use patterns, economic impacts, and regulation leaves many uncertainties concerning the degree of risk and contributes enormously to the complexity of the management problem. Government policies and programs at all levels are fragmented but major efforts are underway to rationalize the decision-making process. This class reviews the nature and scope of the problem,

toxicological and physical-chemical studies, control technology, economic and legal aspects, perceptions of risks and management approaches.

INSTRUCTOR: R.P. Côté

#### ENVI 5006.03: Environmental Toxicology.

This class presents some of the major principles and concepts of current environmental toxicology, with an emphasis on ecotoxicology. It includes case studies and examples from local, national and international sites, both terrestrial and aquatic. Lectures cover the behavior of chemicals in the environment (chemodynamics) and organism (pharmacokinetics), risk assessment, concepts and applications of ecotoxicology, toxicology and environmental epidemiology, and the integration of chemical, physical and toxicological data into hazard and risk assessments. A number of case studies are covered in detail, including pesticide use in forestry, metals in coastal waters, marine toxins, contaminated harbour sediments, and hydrocarbons in the marine environment. The pivotal role of ecotoxicology in identifying critical environmental problems and aiding in their prevention, control and resolution is emphasized throughout.

INSTRUCTORS: B. Freedman, P. Wells

#### ENVI 5008.03: Nature Conservation.

This class traces the development of human economy and the resultant impact on the wild environment. Particular attention is paid to human population dynamics, biotic extinctions and land-use patterns. Having identified the causes of impoverishment of biodiversity the class examines possible cures, including: sustainable development, conservation science and environmental ethics. Special attention is paid to the establishment and management of protected areas.

INSTRUCTOR: M. Willison

CROSS-LISTING: BIOL 3601.03

#### 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: J. Guernsey

CROSS-LISTING: CH&E6001.03

#### ENVI 5020.03: Resource Systems and Economic Development.

Through past mismanagement and heavy exploitation, resources in many parts of the world are being degraded and used in a non-sustainable fashion. Aside from loss of ecological values, the cost is high in economic and social terms particularly for meeting future needs. This class reviews environmental constraints and opportunities for renewable resource development in Canada and selected Third World countries. Rather than treat resources individually, attention is given to resource systems with consideration of their ecological functions. Particular attention is given to integrated management approaches as the basis for sustainable social and economic development.

INSTRUCTOR: S. Wood

#### ENVI 5021.03: Fisheries Management.

This interdisciplinary class will focus on the theory and practice of fishery management and development, with an emphasis on the theme of Sustainable Fishery Systems. By the end of the class, students will have an appreciation for the nature of fisheries, their

structure and dynamics, and key present-day themes relating to managing fisheries for sustainability and resilience. The class will not follow a lecture format, but will operate as an independent reading class in which students work primarily on their own, meeting with the professor individually as needed and in groups on an occasional basis. Students will be expected to attend relevant fisheries and coastal seminars at St. Mary's University and elsewhere.

### **ENVI 5030.03: Managing for Sustainable Development.**

Sustainable development has become a defining concept in public policy debates during the late 20th Century, yet it is widely misunderstood and misused. This seminar explores the various dimensions of the concept, drawing upon a wide variety of disciplinary literature, including that of ecological economics. This class is not just for a disciplinary or even interdisciplinary understanding, but rather for a transdisciplinary framework that will provide a new way of thinking about the future of our globe as we pass into a new millennium. Since the path of inquiry enters incompletely charted territory, the class is experimental and participatory, joining faculty, guest speakers and a small number of students in a creative quest.

INSTRUCTOR: S. Wood

PREREQUISITES: A graduate student in any programme (submit a curriculum vitae), and an interview with the instructor.

CROSS-LISTING: PUAD 6775.03

### **ENVI 5031.03: Environmental/Ecological Economics.**

This class is designed as a one term introduction to economics for MES students who do not have any undergraduate economics. 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. Wood

### **ENVI 5035.03: Research Methods.**

This class recognizes that MES graduates will be both practitioners and critical users of research. Interdisciplinary research makes heavy demands on both groups, requiring an extensive knowledge base, familiarity with a wide range of methods and techniques and the ability to make connections and place work in context. How do we initiate such research, and how do we recognize its quality?

Part of the class deals with the practice of research. We attempt to answer questions about the nature of research, the formulation of questions, design of research programs and ethical issues, as well as the business of research. The latter part of the class provides a detailed overview of frequently used research methods and means of data analysis. Exercises and readings are designed to provide students with a sufficient introduction to recognize the strengths and limitations of various methods.

INSTRUCTOR: P. Duinker

### **ENVI 5038.03: Public Involvement in Resource Management.**

Students will take a learning-community approach to their investigations into the many ways in which the public can become involved in resource management. Considerable attention will be given to rationales for and barriers to public involvement. Assignments will include major literature reviews, oral presentations in class, and group work on major case studies.

INSTRUCTOR: P. Duinker

### **ENVI 5039.03: Indigenous Peoples and Natural Resource Issues.**

This is a special topics class which includes readings, discussion, guest lecturers and videos. Readings will include: Burger, *The Gaia Atlas of First Peoples*; Bodley, *Victims of Progress*; Richardson, *Drumbeats*; and Cohen, *Treaties on Trial*, as well as recent films and videos.

INSTRUCTOR: F. Cohen

### **ENVI 5041.03: Environmental Education.**

This new class will provide 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: F. Cohen

### **ENVI 5044.03: Industrial Ecology Seminar.**

Industrial production systems are economic institutions operating in a physical and biological world; economies are contained within and dependent on ecosystems. Environmental management implies that human requirements can be fulfilled while preserving ecological integrity. It is becoming quite clear, however, that human economies depend on the products and services provided by healthy, functioning ecological systems. Industrial ecology is a framework which analyzes the flows of materials and energy within a web of producers, consumers and decomposers, resulting in the design and operation of industrial infrastructures within the carrying capacity of natural ecosystems.

The class will be a 13-week seminar series in which students will discuss various perspectives and aspects of industrial ecology including waste minimization, pollution prevention, design for environment, life cycle analysis and industrial ecosystems.

INSTRUCTOR: R.P. Côté

### **ENVI 5047.03: Protected Areas Management.**

The class examines the selection, design and management of protected natural areas, such as national parks and provincial nature reserves. The theory and practice of protected areas systems is examined. The primary focus of the class is on natural areas protection for biodiversity conservation, but other uses of protected areas (e.g. tourism, recreation and science) will also be considered. Conflicting uses of protected areas will be examined, as will conflicts between the management objectives of protected areas and those of adjacent lands. Protected areas in both terrestrial and marine environments are considered. In the case of marine protected areas, their use in fisheries management is reviewed. Several texts are used and guest speakers from organizations involved in protected areas management are involved.

INSTRUCTOR: M. Willison

### **ENVI 5048/49.03: Independent Readings.**

A reading class must first be approved by the Programme Coordinator. After obtaining approval, these classes are available by arrangement with appropriate faculty members. An example of a reading class might be 'Readings in Marine Ecotoxicology' with Dr. Peter Wells (Environment Canada).

**ENVI 5110.03: Resource Economics.**

This class is designed to be an introduction to the theory and application of resource economics for students with a background in economics and the mathematics of optimization. It includes consideration of interpersonal and intertemporal decision-making criteria, the basic theory of nonrenewable resource exploitation (including Hotelling's theory of the mine), as well as a basic forestry model (i.e., the Faustmann model) including extensions which allow for benefits that arise from standing forests. It also considers the Gordon-Schaefer model of the fishery, common-property problems, and optimal dynamic harvesting decisions.

INSTRUCTOR: P. Burton  
CROSS-LISTING: ECON 5516.03

**\*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: B. Freedman  
CROSS-LISTING: BIOL 5060.03

**\*ENVI 5180.03: Coastal Communities in the North Atlantic.**

Coastal communities as a social/ecological type are examined as populations, and social structures (territorial, economic, occupational, political) as they have developed in response to particular ecological and social circumstances. Various perspectives which have been applied to coastal communities are examined with regard to the contribution they make to understanding the dynamics of these communities.

CROSS-LISTING: SOSA 3220.03/5220.03

**ENVI 5200.03: Environmental Law.**

This class is designed to provide students with an overview of substantive and procedural aspects of Canadian environmental law. Material will cover both law and policy for environmental protection and control. The class will involve lectures, guest speakers and class participation. A strong emphasis will be placed on the Canadian legislative and regulatory framework and constitutional dilemmas arising from the unique character of the regulated subject areas such as toxic substances, fisheries, water quality, forests, parks and wildlife. The role of the common law in preventing or redressing environmental degradation will also be considered. Emphasis will also be placed on critical procedural processes, alternative approaches to achieving compliance, burden of proof, alternative dispute resolution, standing and costs.

INSTRUCTORS: P. Saunders, D. Vander-Zwagg  
CROSS-LISTING: LAWS 2104.03

**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: E. Meltzer  
CROSS-LISTING: LAWS 2041.03, MARA 5009.03

**ENVI 5480.03: Environmental Ethics.**

Topics include, intrinsic and instrumental value, anthropocentric, biocentric and ecocentric perspectives, individualistic (animal rights) and holistic ethics, deep ecology, social ecology, ecofeminism, spiritual ecology, radical ecology, indigenous perspectives. Issues include endangered species, biodiversity, wilderness, economics, sustainability, factory farming, vegetarianism, health, population/consumption, and climate change.

INSTRUCTOR: K. Beazley  
CROSS-LISTING: PHIL 2480.03

**\*ENVI 5601.03: Management of the Marine Environment.**

The marine coastal zone must be seen as a intricate multi-disciplinary structure, with its own principles and resources and with unique requirements. Increasing coastal urbanization and industrialization, plus multi-faceted use of the near-shore oceanic environment, put new and complex pressures on its marine resources. The system will be examined through a series of core lectures linked with expert guest lectures, and readings. Topics include coastal geology and oceanography, fisheries, aquaculture, transportation, coastal conflicts, management plans, legal frameworks and regimes. The class is graduate or senior undergraduate level (with professor's approval) and is open to students from all disciplines.

**ENVI 5818.03: Management and the Natural Environment: An International Perspective.**

See class description for BUSI 6813.03 in the Business Administration section of this calendar.

**ENVI 5819.03: Environmental Management Systems for Business.**

See class description for BUSI 6816.03 in the Business Administration section of this calendar.

**ENVI 9000.00: Master's Thesis.**

# Food Science and Technology

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Location: "D" Building, 4th Floor  
1360 Barrington St.  
Halifax, NS B3J 2X4  
Telephone: 902-494-6030  
Fax: 902-420-0219  
E-mail: food.science@dal.ca  
Website: http://www.dal.ca/~Foodsci

## Department Head

Gill, T.A., BSc, MSc (Guelph), PhD (UBC). Food proteins and enzymes, seafood quality, safety and preservation.

## Professor Emeritus

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.

## Professors

Paulson, A.T., BSc(Agr), MSc, PhD (UBC). Food chemistry, physico-chemical properties, polymers, emulsions and gels, dielectric methods, thermal processing, packaging & HACCP.  
Speers, R.A., BSc(Agr), MSc, PhD (UBC). Brewing science, food fermentation, rheology, colloid science.

## Assistant Professor

Truelstrup Hansen, L., Cand. brom., PhD (Roy Vet Agr Univ Denmark). Food microbiology, seafood and food safety, antimicrobial peptides, probiotic bacteria, bacterial stress responses.

## Adjunct Professors

Chan, J. K-H., BSc (Hong Kong), MSc (Reading), PhD (TUNS). Nutraceuticals, functional foods.  
Lall, S.P., MSc, PhD (Guelph). Nutrition, Aquaculture.  
Merritt, J.H., BEng (TUNS), MSc (Birm), PEng, CEng. Process engineering, refrigeration.  
Pink, D.A.H., BSc (Hons StFX), PhD (UBC). Physics.  
Stewart, J.E., BSc, MSc (Agr) (UBC), PhD (Iowa State). Microbial oxidation of hydrocarbons, Infectious diseases of crustaceans, Physiology of production of marine algal toxins and the roles of associated bacteria.  
Stewart, R.J., BSc, MSc, PhD (Toronto). Brewing microbiology, fermentation, biotechnology.

## 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 foodborne 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 Canada, the Health Protection Branch of Health Canada, 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 are associated 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 and Fisheries Engineering at the Master and Doctoral levels. The Department 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".

## II. Classes Offered

### 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 colours, and seafood safety.

EXCLUSION: FST6324

### 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, phytochemicals and post-harvest physiology.

### FOSC 6329.03: Chemistry of Fats, Oils and Lipids.

The differences 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 is 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, psychrometry, 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, is presented.

### **FOSC 6332.03: Industrial Biotechnology.**

This class deals with biotechnological and engineering principles employed in the fermentation industry. Unit operations of traditional fermentation and dairy industries are examined from a Food Science and Chemical Engineering perspective. Other topics covered include: enzyme and fermentation kinetics, reactor design, oxygen transfer, production of food ingredients such as xanthan and gellan gums, citric acid and enzymes.  
PREREQUISITES: permission of the instructor.

### **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 behaviour 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 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 programme.

### **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 7350.03: Graduate Seminar II.**

This seminar class is designed to provide students pursuing a Ph.D. 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 Ph.D. students are expected to take the seminar class every academic term for the duration of their programme.

### **FOSC 7351.03: Directed Studies II.**

This class allows students pursuing a Ph.D. 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.**

# French

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## Chairperson of Department

Mopoho, R.

## Professors Emeriti

Chavy, P. Agrégé des Lettres (Paris), Chevalier de la Légion d'Honneur  
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  
Bishop, M., BA, BEd (Manchester), MA (Man), PhD (Kent, Canterbury), Graduate Coordinator, McCulloch Professor. Poetry and poetics, modern and contemporary literature, contemporary culture, French art, symbolism, cinema, nineteenth-century literature  
Bonnell, R., Licence (Paris), MA (Essex), Dr. de 3<sup>e</sup> cycle (Paris). Eighteenth-century French studies  
De Méo, P., BA, MA, PhD (UCLA). Applied linguistics (L2 acquisition/teaching), nineteenth-century literature  
Gordon, W.T., BA, MA, PhD (Toronto). Semantics, history of linguistics, translation theory, general linguistics, French second-language studies, contrastive studies  
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

Trèves, N., BSc (American U, Cairo), PhD (Rice). Renaissance literature, twentieth-century literature, semiotics, women's studies

## Assistant Professor

Elson, C., BA, MA (Dalhousie), Dr de 3<sup>e</sup> 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  
Mopoho, R., BA (Yaounde, Cameroon), MA, PhD (Montreal). Linguistics, lexicology, the science of translation

## Adjunct Professors

Arpin, M.P., BA, MA (Manitoba), PhD (Laval), Saint Francis Xavier University  
Best, J., BA (UWO), MA, PhD (Strasbourg), Acadia University  
Bishop, N., BA, BEd, MA (Sask), Dr. de 3<sup>e</sup> cycle (d'Aix-Marseille), Memorial University of Newfoundland  
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  
Graham, D., BA (Hons) (Sask), MA, PhD (Western), Memorial University of Newfoundland  
Kocay, V., BA, MA (Man), PhD (Toronto), Saint Francis-Xavier University  
Lavoie, L., BA (Laurentian), MA (Laval), PhD (d'Aix-Marseille), University College of Cape Breton  
Lemelin, J.-M., BA, MA, PhD (Sherbrooke), Memorial University of Newfoundland  
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

Cormier, Y., BEd (Moncton), MA (Laval), PhD (Sherbrooke), Université Sainte-Anne  
O'Reilly, M., BA (Carleton), MA, PhD (Ottawa), Memorial University of Newfoundland  
Pearre, A., BA (Dal), MA (McGill), PhD (Dal)

## I. Degree Programmes

### 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.
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 programme 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 programme, the equivalent of at least five university credits is required. This will consist of thesis (usually equivalent to two credits) plus three 5000-level credits. In a two-year full-time programme, 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 programme.
4. In addition to the five credits, all MA students are normally expected to take a half-year 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 programme corresponds to three years part-time. A two-year full-time programme 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 Programme

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 programmes 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 programme of graduate studies. All graduate students must be registered before classes begin.

## III. Classes Offered

What follows is a list of PhD and MA classes. Classes required in particular cases will be specified in each student's Programme 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.

INSTRUCTORS: R. Bonnel, W.T. Gordon, 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: 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: 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: 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: 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.

### **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: W.T. Gordon

### **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: R. Mopoho

### **FREN 5130.03: Linguistique saussurienne/Saussurean Linguistics.**

An intensive study of Saussure's work, giving equal emphasis to 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: W.T. Gordon

### **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, as well as to language teachers who like to work with texts. 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, synonymy, 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.

### **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 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: 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: H. Runte

**FREN 5301.03: Lectures: littérature médiévale/Readings in Mediaeval Literature.**

Individualized reading programmes in selected genres or periods or on specific literary phenomena.

INSTRUCTOR: 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.

INSTRUCTOR: N. Trèves

**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 "autportrait" 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.

INSTRUCTOR: N. Trèves

**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: 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: R. Bonnel

**FREN 5610.03: Ethique et esthétique de la nature dans l'art et la littérature du 18e siècle/Ethics and Aesthetics of Nature 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).

INSTRUCTOR: R. Bonnel

**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.

INSTRUCTORS: P. DeMéo, V. Frigerio

**FREN 5701.03: Le Roman du dix-neuvième siècle/Nineteenth-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: 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 studied 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: M. Bishop

**FREN 5801.03: Anti-romans du vingtième siècle/ 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: M. Bishop

**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 Chéhid and Bonnefoy, to Du Bouchet, Albiach, Bancquart and Réda.

INSTRUCTOR: M. Bishop, 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: M. Bishop

**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, Uzac, Bonnefoy, Da Silva.

INSTRUCTOR: M. Bishop

**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: 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, Tapiés, Wittig.

INSTRUCTOR: M. Bishop, 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, Djébar, Glissant and Ernaux. Generic, textual and conceptual specificities will be related to theoretical and critico-methodological considerations.

INSTRUCTOR: M. Bishop

**FREN 5809.03: Art, Cinéma et Littérature en France: 1920-2000/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: M. Bishop

**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: 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: 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: 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 Chérid, Raphaële Billetdoux. The class will center around the literary and poetic "écritures", and when appropriate it will consider contemporary theoretical gender constructs.

INSTRUCTOR: N. Trèves

**FREN 5990.06: Projet indépendant/ Independent Project (MAT).**

Subject to independent completion of study.

**FREN 5998.03A/5999.03: Recherches indépendantes/ Independent Research.**

Subject to approval by graduate coordinator and department chairperson.

**FREN 9000.00 MA Thèse/Thesis.****FREN 9530.00 PhD Thèse/Thesis.****IV. Thesis Areas****Literature, Linguistics, Culture**

- (A) 20th Century: literatures of France, Quebec, Acadia and other francophone regions: poetry, novel, theatre, poetics, structural stylistics, aesthetics, fine arts, cinema, theory
- (B) 19th Century: novel, poetry, "conte fantastique", studies in romanticism, realism and symbolism, aesthetics, fine arts
- (C) 18th Century: novel epistolarity, aesthetics, fine arts
- (D) 17th Century: novel, Molière and the theatre, La Bruyère and "les moralistes"
- (E) 16th Century: the work of Montaigne and the philosophical, thought of his time
- (F) Medieval: Arthurian and courtly romance
- (G) Linguistics: semantics and lexicology and their modern history, contrastive studies and terminology.
- (H) Acadian literature and language.
- (I) Semiotics of culture: the relationship between contemporary French culture and communication; culture as a sign; cultural ideologies; culture and visual systems.

# German

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## Chairperson of Department

Schwarz, H.-G.

## Graduate Studies Coordinator

Schwarz, H.-G.

## Honourary Professor

Michelsen, P., PhD (Göttingen), Professor of German, Heidelberg University

## Professor Emeritus

Gaede, F.W., PhD (Freiburg), FRSC

## Professor

Schwarz, H.-G., MA (Munich), PhD (McGill)

## Associate Professors

Curran, J.V., MA, MA (Dal), PhD (Newcastle-upon-Tyne)  
Steffen, D.H., PhD (Göttingen)

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, Realism and Ornament.

Graduate students may concentrate on any of the periods or any particular aspect of the history of German literature and thought.

## I. Admission Requirements

Candidates must satisfy the general requirements for admission to the Faculty of Graduate Studies.

## II. MA Degree Programme

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.

## III. Classes Offered

### **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.

INSTRUCTOR: F. Gaede

### **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.

INSTRUCTOR: D. Steffen

### **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.

INSTRUCTOR: D. Steffen

### **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.

INSTRUCTOR: D. Steffen

### **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.

INSTRUCTOR: D. Steffen

### **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: F. Gaede

### **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.

INSTRUCTOR: F. Gaede

### **GERM 5630X/Y.06: Aesthetic Theory.**

An historical study of the development of literary theory and its foundation on the history of thought.

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: F. Gaede

### **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.

INSTRUCTOR: F. Gaede

### **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: H.-G. Schwarz

### **GERM 5701.03: Special Topics II.**

This is an intensive research seminar dealing with selected topics to be announced.

INSTRUCTOR: 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: H.-G. Schwarz

### **GERM 9000.00: Thesis.**

## **Health and Human Performance**

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Location: 6230 South Street  
Halifax, NS B3H 3H5  
Telephone: (902) 494-2152  
Fax: (902) 494-5120  
Website: www.dal.ca/hahp

### **Director of School**

Livingston, L.A.

### **Professor Emeritus**

Belzer, Jr., E.G., BS (West Chester State Coll), MS (Maryland), PhD (Illinois)

### **Professors**

Holt, L.E., BS, MS (Springfield), PhD (S Illinois). Analysis of human movement, exercise prescription, sport conditioning, flexibility and strength  
Keddy, B., BScN (MSVU), MA, PhD (Dal), RN, major appointment in the School of Nursing.  
Kirby, R.L., MD (Dal), FRCP(C), major appointment in Medicine. Rehabilitation, wheelchair, amputation, crutch, cane, assistive technology, disability, handicap  
Lyons, R.F., BA (Dal), MEd (Xavier), PhD (Oregon). Leisure, chronic illness and disability, coping and adjustment, personal relationships, therapeutic recreation  
Maloney, T.L., BPE (Alberta), MA (Western), PhD (Alberta). Injury prevention, safety education  
McIntyre, L.L., MD, MHSc (Toronto), FRCP(C), Dean of the Faculty of Health Professions, joint appointment in Health Services Administration. Child health, programme evaluation, children's nutrition programmes, health policy, health promotion  
Singleton, J.F., BA (Waterloo), MS (Penn State), PhD (Maryland). Therapeutic recreation; therapeutic recreation for persons with Alzheimer's disease, gerontology, pre-retirement planning, therapeutic recreation for persons with disabilities, the use of secondary data in leisure research, cultural diversity of leisure experience, women and leisure  
Turnbull, G.I., MCSP, DipTB, BPT (Man), MA (Dal), PhD (Rhodes), major appointment in Physiotherapy

### **Associate Professors**

Amaratunga, C., BA, MSc (Guelph), PhD (Toronto), Executive Director, Maritime Centre of Excellence for Women's Health  
Campagna, P.D., BPHE (Windsor), BEd (Queen's), MEd (SUNY-Buffalo), PhD (Alta). Physical fitness, mental health, cardiovascular risk factors, activity questionnaires, strength  
Elder, G.C.B., DipPE Adv (St. Mary's, London), MEd (Georgia Southern), PhD (McMaster). Cerebral Palsy, neurophysiological mechanisms, treatment for contractures, motor control, computerized biofeedback training  
Ipson, N.M., BA, MS, PhD (Brigham Young). Leisure and aging; leisure programming, assessment and evaluation; volunteering as a leisure experience; volunteer and personal management; recreation administration; market segmentation and target marketing of leisure experiences  
Kozey, C.L., BPE (UNB), BSc (Waterloo), PhD (Dal), major appointment in the School of Physiotherapy. Mechanics and electrophysiology of human movement  
Livingston, L.A., BA-BPHE, MSc (Queen's), PhD (Calgary). Biomechanics with emphasis on the link between lower limb morphology and knee pathologies, and human gait; sports vision; ocular injuries in sport.

McCabe, J.F., BPE, BA (UNB), MS, EdD (Tenn). Cognitive ergonomics, expertise and skilled performance, systems modelling, occupational stress and performance  
 Pelot, R., BSc (Ottawa), MSc (Alberta), PhD (Waterloo), Major appointment in Industrial Engineering  
 Putnam, C.A., BPE (Man), MS (Wash), PhD (Iowa). Biomechanics, mind/body health, workplace health determinants.  
 Savoy, C.A., BPE (UNB), EdM (Boston), PhD (Tenn). Performance enhancement, exercise adherence, team building, psychological skills, goal setting, imagery, manager as coach, mental fitness, group cohesion  
 Verabioff, L.J., BA, BPHE (Queen's), MS (Mich), PhD (Ohio State). Principles of motor performance, practice variables affecting skill acquisition

### Assistant Professors

Barnes, L.J., BPE, MSc (Dal). AIDS education, grieving and loss, rubella screening  
 Cheung, S., PhD (Toronto), MSc (Simon Fraser Univ), BSc Honours (UBC). Environmental physiology.  
 Gahagan, J., BA, BA (Hons) (Carleton), MA (Windsor), PhD (Wayne State). Women's health, HIV/AIDS, programme planning and evaluation.  
 Jackson, L.A., BA, MA, PhD (Toronto). Sexual health, gender and health and prevention issues related to women's health  
 Kozey, J.W. BSc, MSc (Waterloo), PhD (TUNS). Clinical and occupational biomechanics; ergonomics - workstation design, anthropology, reach and read modeling; rehabilitation measures, job accommodation

### Adjunct Professor

Beazley, R.P., BA, BEd (Acadia), BPE (McMaster), MPE (Dal), EdD (Tennessee)  
 Brooks, C., MBChB (Manchester), DAuMed (London), MFVMD, FFDM (Royal College of Phys)  
 Mangham, C.R., BEd, MA (UBC), PhD (Oregon)  
 McGuire, D.P., BA (Wright State), MA (Cincinnati)  
 Richards, A., DipPE (Carnegie School of Phys Ed, England), Teach. Cert. (Trent Park Col), MSc (Dal), EdD (Colorado)

The mission of the School is to develop leaders and scholars who can generate, disseminate, and apply knowledge that helps to maintain and enhance health. It does this by: engaging in research related to well-being; preparing leaders in education, scholarship and social action to maintain and enhance well-being; and playing an educational and advocacy role, with and beyond the University, to affect social change that maintains and enhances well-being.

The School of Health and Human Performance offers master's degree programmes in three areas: Master of Arts in Health Education, Master of Science in Kinesiology and Master of Arts in Leisure Studies. There are ongoing research programmes in each of the areas of health education (basic health-related research and evaluation of health education/health promotion policies, programmes, 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 programmes, students are referred to the Graduate Student Handbook of the School of Health and Human Performance, which is available from the Associate Director (Graduate Studies).

## 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 programmes 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 Education or Leisure Studies. Those with appropriate qualifications are normally registered in the one-year master's programme. Students from undergraduate programmes in related fields (other than Health Education, 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 programme.

Qualifying work may be required of applicants whose background for advanced studies in Health Education, Kinesiology, or Leisure Studies is judged deficient.

### Programme 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 programmes 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.

Five credits (30 credit hours) at the graduate level are required in all programmes - 18 credit hours of classes and 12 credit hours of thesis work. Required and elective classes for each programme 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 programme of study.

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 the appropriate ethics committee 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 additional member appointed by the Associate Director (Graduate Studies).

The School holds research-oriented seminars during the academic year. It is expected that students will attend and participate in these seminars as discussants and presenters.

Students are urged to consult the Graduate Student Handbook produced by the School of Health and Human Performance and the School's web site ([www.dal.ca/hahp](http://www.dal.ca/hahp)) for further information regarding our programmes, and regulations specific to the School.

## II. Degree Programmes

### A. Master of Arts (MA) in Health Education

While the general goal of health education is to promote the health and well-being of individuals and their communities, the Master of Arts (Health Education) focuses on the evaluation of community health education and health promotion policies, programmes, practices and content. Its graduates are prepared to assume major roles and responsibilities in evaluation of and research concerning health education activities.

#### Required Classes: 24 credit hours

- HEED 5503.03: Intermediate Statistics for Health Sciences  
 Prerequisite: Before entering HEED 5503.03 students must have completed an introductory class in statistics with at least a "B" grade.

- HEED 5514.03: Trends in Health Education (L. Jackson) OR HEED 5516.03: Theoretical & Scientific Bases of Health Education.
- HEED 5595.03: Measurement & Evaluation in Health Education and Health Promotion. (J. Gahagan)
- HEED 9000.00: Thesis. 12 credit hours
- LEIS 5501.03: Advanced Research Methods in the Social and Natural Sciences (J. McCabe) OR comparable class approved by the thesis advisor

**Elective Classes: 6 credit hours**

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.

- HEED 5514.03 and HEED 5516.03 as listed above.
- HEED 5600.06/5601.03/5602.03: Independent Studies. Open to independent completion of study. Interested students should consult the Associate Director (Graduate Studies).
- HEED 5620.03: Topics in Health Psychology. Cross-listed with PSYO 6420.03. (This class is not offered every year.)

**B. Master of Science (MSc) in Kinesiology**

**Required Classes: 21 credit hours**

- KINE 5501.03: Advanced Research Methods in the Social and Natural Sciences (J. McCabe)
- KINE 5590.03: Measurement and Instrumentation (J. Kozey)
- One of:
  - KINE 5510.03: Cardiorespiratory Dynamics in Exercise (P.D. Campagna)
  - KINE 5516.03: Neuromuscular Physiology (G.C.B. Elder)
  - KINE 5523.03: Biomechanics of Human Motion (C.A. Putnam)
  - KINE 5530.03: Cognitive Ergonomics (J.F. McCabe)
- KINE 9000.00: Thesis. 12 credit hours

**Elective Classes: 9 credit hours**

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.

- 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 (J.F. McCabe)
- KINE 5600.06/5601.03/5602.03: Independent Studies. Open to independent completion of study. Interested students should consult with the Associate Director (Graduate Studies).

Elective classes can be taken from within or outside the School. All classes must be approved by the student's advisor.

**C. Master of Arts (MA) in Leisure Studies**

**Required Classes: 21 credit hours**

- LEIS 5501.03: Advanced Research Methods in the Social and Natural Sciences. (J. McCabe)
- 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. (R.F. Lyons)
- LEIS 9000.00: Thesis. 12 credit hours

**Elective Classes: 9 credit hours**

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.

- 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. (J.F. Singleton)

- LEIS 5600.06/5601.03/5602.03: Independent Studies. Open to independent completion of study. Interested students should consult with the Associate Director (Graduate Studies).

**III. Classes Offered**

**HEED 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.

INSTRUCTOR: Math Department

CROSS-LISTING: STAT 5990.03

PREREQUISITE: An introductory statistics class

**HEED 5514.03: Trends in Health Education.**

To be an effective leader in health promotion/health education, he 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.

HEED 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.

INSTRUCTOR: L. Jackson

**HEED 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 programme or programme evaluation, and that is in a form suitable for appearance in a scholarly or popular publication.

**HEED 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 programmes 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 programmes, students are encouraged to become practitioners who evaluate.

INSTRUCTOR: J. Gahagan

**HEED 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 behaviour (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 behaviours and stressors such as compliance strategies.

INSTRUCTOR: R. Lyons, P. McGrath

CROSS-LISTING: PSYO 5420.03

**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.

INSTRUCTOR: J. McCabe  
CROSS-LISTING: LEIS 5501.03

### **KINE 5503.03: Intermediate Statistics for Health Sciences.**

See listing for HEED 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.

INSTRUCTOR: P. Campagna, S. Cheung

### **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.

INSTRUCTOR: G. Elder

### **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.

INSTRUCTOR: C. Putnam

### **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.

INSTRUCTOR: J. McCabe

### **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.

INSTRUCTOR: J. McCabe

### **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.

INSTRUCTOR: J. Kozey

### **LEIS 5501.03: Advanced Research Methods in the Social and Natural Sciences.**

Please see class description for KINE 5501.03.

INSTRUCTOR: J. McCabe

CROSS-LISTING: KINE 5501.03

### **LEIS 5503.03: Intermediate Statistics for Health Sciences.**

See listing for HEED 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.

INSTRUCTOR: R. Lyons

### **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 programmes 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 programmes 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 Behaviour 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 behaviour. The role of organized recreation and leisure delivery systems in institutions and community settings is also elaborated on in this class.

INSTRUCTOR: J. Singleton

### **LEIS 5592.03: Interdisciplinary Basis of Leisure Science.**

Leisure behaviour 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 behaviour 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.

INSTRUCTOR: R. Lyons

# Health Services Administration

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Location: 5599 Fenwick Street  
Halifax, NS B3H 1R2  
Telephone: (902) 494-7097  
Fax: (902) 494-6849  
E-Mail: Health.Services.Administration@Dal.Ca  
Website: www.dal.ca/shsa

## Director of School

Rathwell, T., BA (York), MA, PhD (Dunelm). Health care reform, comparative health care systems, primary health care policies.

## Professor Emeritus

Ruderman, A.P., BS, MA, PhD (Harvard), MBA (Chicago)

## Professors

McIntyre, L.L., MD, MHSc (Toronto), FRCPC, joint-appointment in the School of Health & Human Performance

Nestman, L., BComm (Sask), CA, MHSA (Alta). Health services accounting, health finance, health policy, international health care

Rathwell, T., BA (York), MA, PhD (Dunelm)

Sketris, I., BSc (Pharm) (Toronto), PharmD (Minn), MPA (HSA) (Dal), major appointment in College of Pharmacy

## Associate Professor

Johnston, G., BSc(Hons) (McGill), MHSA (Alta), PhD (Western). Cervical cancer screening, palliative care, breast cancer issues, cancer registries

## Assistant Professors

Hanlon, N., BAA (Ryerson), MA, PhD (Queens). Primary care reform, programme evaluation, information system and decision support

Hayden, V., BSc (Hons) (LMU), MA, PhD (Bradford) Honorary

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

## Lecturers

Cochrane, W.D., BA(Hons), LLB (Dal)

Ferguson, D., BEd, BSc (Buffalo), Honorary

Hampton, M.J., BA, MHS (pending) (Toronto), Honorary

Langille, E., BA, MA (Dal)

Marsh, W., BComm (Dal), MBA (SMU)

McKillop, D., BA (York), MIR (Toronto)

Maddalena, V., BN, MHSA (Dal)

Maxwell, M., BA (Acadia), BD (Planning) (NSCAD), MES, MHSA (Dal), Honorary

Montgomery, B., BScN (MSVU), MHSA (Dal), Honorary

Moore, C., BScN (MSVU), MScN (Toronto), Honorary

Nurse, R., BA (MUN), MHSc (Toronto), Honorary

Zed, R., CPA, BA, MHSA (Dal), Honorary

Students seeking further information or help in planning classes of study in the School of Health Services Administration should contact the:

Graduate Co-ordinator  
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 programme is accredited by the Accrediting Commission on Education for Health Administration, and the School is a full member of the Association of University Programmes in Health Administration. The school is also a member of the European Health Care Management Association.

## I. Objectives

The School of Health Services Administration offers a Masters degree which meets the needs of those pursuing administrative careers in the Canadian health care delivery system. The programme 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 programme 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 programme 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 programme 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 to the Registrar's Office.

The following supporting documents are to be sent directly to the School:

- Transcripts of all previous academic work
- At least two academic letters of reference
- Résumé/Curriculum Vitae
- A statement of career interests and reasons for seeking admission to the School
- GMAT (see below)
- TOEFL for Foreign Students (see below)

The application (including all supporting documentation) must be received by June 1, for September admission.

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 better. 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 (score of 237 on computerized version of TOEFL). 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.

The deadline for applying to the School is June 1. For foreign students, it is strongly recommended that all documents (transcripts and references) be submitted prior to January 31 for students who wish to be considered for financial support.

### III. Degree Programmes

#### A. Part time Study

The Programme 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 programme 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 programme must satisfy the entrance requirements of both programmes, and may obtain further information about the combined programme 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 programme may submit LSAT results in lieu of GMAT results.

#### C. MN/MHSA

The combined MN/MHSA programme, a collaborative undertaking between the School of Nursing and the School of Health Services Administration, is a three-year programme which enables students to select classes leading to degrees of Master of Nursing and Master of Health Services Administration.

Candidates for the MN/MHSA programme must satisfy the entrance requirements of both programmes, and may obtain further information about the combined programme 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.

#### D. MHSA/MBA

The combined MHSA/MBA programme, a collaboration between the School of Health Services Administration and the School of Business, is a 3 year programme 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 programme must satisfy the entrance requirements of both programmes and may obtain further information about the combined programme 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.

### 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.

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);
- 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. Classes Offered

The two-year programme 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 programme. 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: Management and Design of Health Care Organizations II.

This class is a seminar that builds on its pre-requisite and is aimed at the further acquisition of knowledge and skills needed for the effective management and design of health care organizations. The focus of the class is on the management of health care organizations and systems within the wider social, political, and economic context. Topics examined include: the environments of health care organizations, organizational goals and effectiveness, strategic management, governance, integrated delivery systems, organizational learning, multi-institutional arrangements, organizational culture, and managing broad-based health systems change. Case analysis, 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; proposing a process to monitor adherence to clinical guidelines; and using Epi-Info for statistical analysis of associations (relative risk, odds ratio, chi-square test, confidence intervals, Mantel-Haenszel analysis, multiple logistic regression). 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 some discussion is used.

### **HESA 5330.03: Management and Design of Health Care Organizations I.**

This class is an introductory seminar on the acquisition of knowledge and skills necessary for the effective management of health care organizations. The focus of the class is on the management of individual and group behaviour in health care organizations with the goal of improving system performance. Topics examined include: the foundations of individual and managerial behaviour, motivation, job design, communication, group behaviour and socialization, leadership, organizational structure and design, conflict management, and power and politics. Case analysis, individual and group assignments, skill-building exercises, as well as student presentations are used extensively to facilitate participation and enhance managerial skills acquisition.

### **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: Health Care Economics I.**

This required class provides the student with a basic understanding of economic theory and the applicability of this theory to health policy and administration. It is a pre-requisite to Health Care Economics II, which emphasizes economic evaluation of health care programmes 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 understand the English language and to possess a basic quantitative skills for economics analysis.

### **HESA 5340.03: Health Care Economics II.**

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 programmes. Health Care Economics I (HESA 5339.03) or an equivalent background in microeconomic theory is a pre-requisite to this class.

### **HESA 5345.03: Health Services Accounting Management and 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 Accounting and 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: management control; performance budgeting; patient classification; work measurement; responsibility accounting; socio-economic aspects of budgeting; cost allocation; multi-year cost; financial decisions; relevant costs; and introduction to funding systems.

### **HESA 6380.03: Senior Seminar in Health Services.**

Each student researches, prepares and presents, under supervision, a major analytical paper on a current and significant health care issue. Preparation of the paper is accompanied by classes that focus on issues for health care administrators. This class is normally taken in the last term of an MHA student's programme. Senior seminar presentations are usually scheduled during the last week of March and the first week of April. All students must attend, and practitioners from the field, and other interested persons are invited to attend. The class is intended to provide the student with opportunities to practice analysis, synthesis and strategic planning in relation to significant health care issues.

### **HESA 6390X/Y.06: Health Services Residency.**

An administrative residency is required for all students in the Master of Health Services Administration programme. The objective of the residency is to provide first-hand familiarity with administrative problems and operations of a health service agency. Each student will have an opportunity to receive personal coaching from a qualified and practicing senior health service administrator, to apply and test administrative theories and concepts in a practical setting, and to acquire some administrative skills, techniques, and perspectives through observation and wide contact with a diversity of health services administrators. Residency guidelines and a Preceptor list will be available to students during the first semester.

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.

### **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.

**Students are required to take at least three of the following classes:**

### **HESA 6310.03: Health Care Policy.**

This class is a seminar whose objective is to introduce the student to the evolution and analysis of Canadian health care policy. Topics in this class include: health reform in Europe, Canada and Nova Scotia; health policy and resource allocation; the role of the bureaucracy, the media, providers, and special interest groups in shaping health policy; political decision making; and public policy analysis. Case studies, individual and group exercises, as well as the analysis and class presentation of a contemporary health care policy problem are used to facilitate participation and learning.

### **HESA 6330.03: Health Services Planning and Evaluation.**

The focus of the class is on the processes, methods, models and techniques of health services planning and evaluation. It explores the role and function of health services planning in a changing health care system, drawing on international experience. Relationships between strategic, and operational planning will be explored, as will the factors that both inhibit or facilitate the planning process. The scope and nature of the programme (service) evaluation will be discussed. The overarching intent 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 care needs, plan services accordingly, and to evaluate the effects of agreed services provision on overall levels of health.

### **HESA 6340.03: Human Resources in Health Care.**

This is a seminar dealing with the study of the principles and practices of strategic human resource management with emphasis on effective human resource adjustments required in response to organizational changes occurring in the health care field. Issues studied will include performance measurement, compensation, "downsizing", mergers and amalgamations, training and development and selection.

### **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

#### **Elective Classes**

Students can choose from the following or any of those above not taken as required.

### **HESA 5400.03: Effective Presentations in Health Administration.**

The purpose of this class is provide health care workers in general and health administrators in particular with an opportunity to develop timely and appropriate presentation skills. By the end of the class, students should be able to organize and deliver appealing and informative written and oral presentations using print, audiovisual and computer multimedia technologies.

### **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 6100.03: Ethics and Decision-Making in Health Services Administration.**

This class has three objectives: first, to raise the awareness of students in relation to the ethical implications of decision-making in health care administration. Second, it will assist students in the development of a framework for exploring and resolving ethical dilemmas in the workplace. This, the class will assist students in examining and developing a greater understanding of their own value system as it relates to the practice of management. The class

is a combination of case study analysis, guest speakers and self-directed study. Students will also have the opportunity to attend ethics committee meetings.

### **HESA 6200.03: International Health Care Management.**

This online (WebCT) class is based on the belief that comparative health care management can be taught most effectively through enabling the student to communicate directly with colleagues in other countries. Practicing health care managers, doctors, nurses, and paramedics, best understand how health care is really provided in their respective environments. The class provides opportunity for joint papers, the debate of issues, the discussion of work-related problems, and hopefully a fun learning experience. The class focuses on several countries which provide an interesting array of approaches to health care. At the same time, they have sufficient commonalities for participants to gain understanding of each system without too much difficulty.

### **HESA 6305.03: Outcomes in Health Services.**

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 6320.03: Managed Care.**

The term "managed care" comes from the American HMO (Health Maintenance Organization) experience and when applied in the Canadian context is interpreted to mean providing quality health care which is comprehensive, seamless, and population (rather than institution) based, while containing cost. Students are to review "managed care" and other literature, and with input from practitioners, propose how managed care and integrated delivery concepts might be used to advantage the Atlantic provinces.

### **HESA 6325.03: Long Term Care Administration.**

This class is designed to enable students to understand and appraise government policies that have shaped the direction of Long Term 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 including drug utilization, community based care, home care models, and living wills.

### **HESA 6341.03: Management Union Relations.**

This is a seminar which provides comprehensive coverage of labour relations in the health care system. Particular attention will be placed on amalgamation and mergers. 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 pretend 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 6375.03: Health Care Marketing.**

Health care administrators confront ongoing and multifaceted challenges, including those of fiscal constraint, policy reform, demographic and social change, and the shifting preferences and expectations of health care consumers and providers. This class explores the applicability of marketing concepts and techniques as a means to enable managers in the health services to respond to these and other challenges. Particular emphasis will be placed on how a marketing perspective can be used in support of strategic management decision making in the Canadian health care context. The class is designed to emphasize student participation and co-leadership in determining seminar content and the direction of work submitted for evaluation. Learning is facilitated through a mix of individual study, seminar discussion, individual and group project work, and formal presentations of class work.

### **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 programme 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.

### **Graduate Electives: One full credit**

The remaining one-credit requirement may be made up from any of the elective classes offered by the School of Health Services Administration or any other graduate studies programme, subject to approval of a faculty advisor.

NOTE: Not all classes are offered each year; consult the school for current year offerings.

## **History**

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Location: 1411 Seymour Street  
Halifax, NS B3H 3J5  
Telephone: (902) 494-2011  
Fax: (902) 494-3349  
e-mail: history@is.dal.ca

### **Chair of Department**

Sutherland, D.A.

### **Graduate Co-ordinator**

Zachernuk, P.

### **Professor Emeritus**

Flint, J.E.  
Waite, P.

### **Professors**

Cross, M.S., BA, MA, PhD (Toronto)  
Crowley, J.E., AB (Princeton), MA (Mich), PhD (Johns Hopkins)  
Hanlon, G., BA, MA (Toronto), PhD (Bordeaux)  
Neville, C.J., BA, MA (Carleton), PhD (Aberdeen), FRHistS  
Parpart, J.L., BA (Brown), MA, PhD (Boston)  
Pereira, N.G.O., BA (Williams), MA, PhD (Calif, Berkeley)  
Traves, T., BA (Man), MA, PhD (York), President and  
Vice-Chancellor, Dalhousie University

### **Associate Professors**

Cadigan, S., BA (Mem), MA (Queen's), PhD (Mem)  
O'Brien, J.T., BA (Wisconsin), MA, PhD (Rochester)  
Sutherland, D.A., BA (MtA), MA (Dal), PhD (Toronto)  
Tillotson, S., BIS (Waterloo), MA, PhD (Queen's)  
Zachernuk, P., BA, MA (Dal), PhD (Toronto)

### **Adjunct Professors**

Conrad, M., BA (Acadia), MA, PhD (Toronto), Acadia University  
Fingard, J., BA (Hons) (Dalhousie), MPhil, PhD (London), FRSC  
Forestall, N., BA (Western), MA (Memorial), PhD (Toronto), St.  
Francis Xavier  
Kirk, J., MA (Queen's), PhD (UBC), Dalhousie University  
McOuat, G., BA, MA, PhD (Toronto), King's College  
Mills, E., BSc (Carleton), MS (Yale), PhD (Yale), Dalhousie University  
Murray, J., MD (Dalhousie), Dalhousie University  
Stokes, L.D., BA (Toronto), MA, PhD (Johns Hopkins)

## **I. Admission Requirements**

Candidates for the one year MA degree must hold a BA Honours degree in history. Those with general history BA degrees or degrees in fields other than history may be placed in a two year MA programme or in a qualifying year programme. Candidates for doctoral study must hold an MA degree in history or in a cognate field.

## **II. Degree Programmes**

### **A. Master of Arts (MA)**

Students admitted into either a qualifying year or a two year MA programme must in the first year take five upper level undergraduate history classes and secure at least a B+ grade in each. Students in the one year MA programme are required to attend the Graduate Seminar which meets weekly during the academic year.

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 programme 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, or one advanced class and a Directed Reading field with a faculty member. In cases where suitable advanced classes are not offered, a student may, at the discretion of the Graduate committee and on the recommendation of the student's principal supervisor, elect to fulfill his or her class requirements through two Directed Reading fields. Classes and fields may be selected from both departmental and extra-departmental offerings, subject to approval of the Graduate committee (at least one class or field must be taught by a member of the History Department). Directed Reading fields are generally examined in early January following the Christmas vacation. Theses may be orally examined at any time, and topics should be chosen with a view to completion twelve months after commencement of the programme. To complete their degree students must submit and orally defend a thesis of not more than 50,000 words.

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.

## **B. Doctor of Philosophy (PhD)**

For minimum time required to complete the programme, 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. 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 exams is deemed to be a mark of A- or better in each exam. 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 programme.

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, British Imperial, 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 (MA and PhD)**

### **A. Canadian History**

The following fields are offered:

History of the Maritimes, with emphasis on the late 18th to mid-20th century; Canadian social history, in particular such areas as poverty and philanthropy, urban and rural social disorder, labour history, and the rise of the city; Canadian political history, particularly the 19th and 20th centuries; Canadian-American relations, particularly since 1867.

### **B. 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.

### **C. British History**

The following fields are offered:

Aspects of British history 1250-1730; aspects of political, social and cultural history, 1914-1979; labour and gender history in the 20th century.

### **D. United States History**

Fields are offered in:

Colonial and revolutionary America, 19th century American social, labour, and ethnic history, and 20th century American political and business history.

### **E. European History**

Students may take a field in French or Italian history (1550 to 1789) emphasizing the sources and methods used in social history, but must have a reading knowledge of either of those two languages.

### **F. 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. A prior reading knowledge of German is required.

### **G. Medieval History**

Fields are available in English, Scottish and medieval European history.

### **H. Russian History**

Two fields are available one in nineteenth-century Russian history and one in twentieth-century Russian and Soviet history.

### **I. History of Political and Social Theory**

Fields may be offered in the broad history of political and social theory (including historiography) or in more specific areas: Renaissance and Reformation political theory, the Enlightenment, and Marxism (including special reference to the Third World).

### **J. Caribbean and Latin American History**

Fields may be offered in aspects of labour (including slave labour history), the impact of imperialism in the 19th and 20th centuries, and transitions to socialism.

### **K. Women's History**

Fields are offered, both as single units and in combination, on women in developed industrial societies (North America), in developing societies (Africa), and in socialist societies (including Cuba and China).

## **IV. Senior Undergraduate Classes**

These classes are open to Graduate Students for which Graduate Credit is assigned.

### **HIST 3462.03: Distortion or Development: 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: J. Parpart

FORMAT: Seminar 2 hours

PREREQUISITE: HIST 2422.03 or 1400.06

CROSS-LISTING: HIST 5462.03

### **HIST 4320.03: Feminism, 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 favourably 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.

INSTRUCTOR: J.L. Parpart

FORMAT: Seminar 2 hours

EXCLUSION: Non-honours undergraduates

CROSS-LISTING: WOST 4320.03, HIST 5320.03

### **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 written permission of a Faculty member and the Undergraduate 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 written permission of a Faculty member and the Undergraduate Coordinator

#### **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.

INSTRUCTOR: N.G.O. Pereira

FORMAT: Seminar 2 hours

PREREQUISITE: Reading knowledge of Russian (at least two years of language study) and some Russian history

RECOMMENDED: RUSN 1000.06, 2000.06

CROSS-LISTING: HIST 3090.03, RUSN 3090.03

#### **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.

FORMAT: Seminar 2 hours

PREREQUISITE: Any second year class in British history

RECOMMENDED: HIST 2105.03, 2106.03, 2005.03, 2008.03

EXCLUSION: HIST 3104.06

CROSS-LISTING: HIST 3105.03

#### **HIST 5110X/Y.06: Rome and the East.**

This class will consider relations between Rome and her eastern neighbours -- 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.

INSTRUCTOR: G. Greatrex

FORMAT: Seminars

CROSS-LISTING: CLAS 4535X/Y.06, 5535X/Y.06, HIST 4110X/Y.06

#### **HIST 5116.03: Advanced Seminar in British History: Culture, Class and Society in Twentieth-Century Britain.**

How does culture reflect social and political change? This class sets out to explore this question in the context of modern British society. Using a variety of texts, such as films like *My Beautiful Launderette*, the photographs of Bill Brandt and Humphrey Spender, the plays of John Osborne, Howard Brenton, and Caryl Churchill, art, architecture, and popular forms of culture, this seminar will examine how issues such as class tension, social change, the decline of empire and the beginning of a multi-racial society, changes in women's status, and other political and social developments were represented in twentieth-century Britain, from the First World War to the present day.

FORMAT: Seminar 2 hours

PREREQUISITE: As this is an advanced seminar in British history, the instructor's permission is required for registration.

CROSS-LISTING: HIST 5116.03

#### **HIST 5222.03: Topics in Canadian Social History, 19th and 20th Centuries.**

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.

INSTRUCTORS: R. Bleasdale, M.S. Cross

FORMAT: Seminar 2 hours

PREREQUISITE: A class in Canadian history

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 programmes financing the welfare state; gender, race, constitutional, and class issues in welfare. Approved with Canadian Studies.

INSTRUCTOR: S. Tilloston

FORMAT: Lecture/tutorial or seminar 2 hours

PREREQUISITE: HIST 1200.06 or HIST 2212.03 or HIST 2230.06

#### **HIST 5261.03: The Rural Experience in Canada.**

The rural experience has dominated Canada's past and continues to exert a strong influence in the present. This class explores the contours of Canadian rural life, examining the impact of rural politics, economics, social relations and ideologies upon Canadian development. Specific themes will vary from year to year.

INSTRUCTOR: C. Danysk

FORMAT: Seminar 2 hours

PREREQUISITES: A survey of Canadian history

CROSS-LISTED: HIST 3261.03

#### **HIST 5271.03: The Fisheries of Atlantic Canada.**

Popular explanations of recent collapses in many Atlantic Canadian marine species assume that fish, as common-property, open-access resources, have been exploited by people without regard for conservation. This considers such 'tragedy of the commons' approaches from two perspectives: social and ecological history. It examines how gender, class and ethnic relationships have shaped fishing communities, and how such communities interact with material changes in marine environments. Topics to be covered will include First Nations' use of marine resources, European settler fishing communities, customary regulation of marine resources,

possible previous ecological crisis affecting fisheries, changes in harvesting technology, state-defined marine property rights, and fisheries' 'professionalization'.

CROSS-LISTED: HIST 4271.03

### **HIST 5292.03: Wealth and Power in North America.**

Business enterprises have played a major role in shaping the social and political as well as economic development of the United States and Canada over the past 200 years - perhaps more so than in most other modern nations. This class explores the growth and significance of business in the history of these two countries.

Among the topics covered are: entrepreneurship, technical innovation and economic growth; the rise of big business and management organization; the convoluted and controversial linkages of business and government; and the emergence of multinational enterprises and their impact on Canadian-American relations. Approved with Canadian Studies.

FORMAT: Lecture/discussion 2 hours

PREREQUISITE: One class in Canadian or U.S. History, or an appropriate class in a related discipline.

RECOMMENDED: A survey class in Canadian or U.S. History

EXCLUSION: HIST 3291.03

### **HIST 5350.03: People and Things - Material Culture in History.**

The class studies the theoretical, cross-cultural, and historical considerations involved in the interdisciplinary study of material culture - economic technology, household comforts, architecture, clothing, even the landscape itself. The chief interpretative issues deal with the relation between consumption patterns and economic, social, and cultural change. The eighteenth-century consumer revolution in Britain and its colonies in North America provide the contexts for this year's examples of empirical research.

INSTRUCTOR: J.E. Crowley

FORMAT: Lecture/discussion 2 hours

### **HIST 5368.03: The United States Since 1929.**

This class traces United States politics, economy, foreign policy and the development of the state during the period from 1929 to 1961.

The goal is to develop a fairly advanced sense of the main events of the period, including the Great Depression, the New Deal political order, America and World War II, the cold War, relations with the Third World, the Korean War, McCarthyism, and the civil rights movement. This class is also intended to expose students to the main literature, historiography and theory on American history in the contemporary period. Students taking this class are strongly encouraged to take its complement, HIST 3369.03.

INSTRUCTOR: J. Vander Meulen

FORMAT: Lecture/discussion

PREREQUISITE: HIST 2333.03 or instructor's permission

### **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 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 labour 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: P. Zachernuk

FORMAT: Discussion 2 hours

### **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 labour 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 declines in the 19th century, many African economies used

extensive internal slave labour 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: P. Zachernuk

FORMAT: Discussion 2 hours

### **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.

INSTRUCTOR: J. Parpart

FORMAT: Lecture/discussion 2 hours

PREREQUISITE: HIST 2421.03 or 2422.03 or 3451.03 or 3461.03 or 3462.03

RECOMMENDED: HIST 3451.03, 2131.03, 2132.03

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: J.L. Parpart

FORMAT: Seminar 2 hours

PREREQUISITE: HIST 2422.03

CROSS-LISTING: WOST 3310.03, HIST 5461.03

### **HIST 5462.03: African Economic History.**

### **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: P.S. Zachernuk

FORMAT: Discussion

### **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 identity affect the idea of being "African"?

INSTRUCTOR: P.S. Zacherunk

FORMAT: Discussion

### **HIST 5500.03: Topics in Modern History.**

This seminar is specifically intended for students in the Advanced Major and Honours degree programmes 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 2 hours

PREREQUISITE: Inquire at Department

CROSS-LISTING: HIST 5500.03

### **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, labour/labour history, political history (including state formation), cultural history, and history of race and national identity. 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.

INSTRUCTORS: J.T. O'Brien

FORMAT: Seminar 2 hours

PREREQUISITE: 3000-level class in modern British, American or Canadian history

CROSS-LISTING: HIST 5600.03

### **HIST 5610.03: Women in North America.**

An examination of the impact of industrialization and urbanization on "women's sphere" in society and of the emergence of various strains of feminism in the nineteenth and twentieth centuries.

CROSS-LISTING: HIST 3610.03

### **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 studied in some depth, where possible using original sources in translation, 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 one or two well-argued and documented papers. Some prior knowledge of medieval European history is essential.

INSTRUCTOR: C.J. Neville

FORMAT: Seminar 2 hours

PREREQUISITE: HIST 2001.03 or 2002.03 or 3002.03

EXCLUSION: HIST 3000.06, HIST 3001.03

CROSS-LISTING: HIST 4003.03

### **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. After some introductory lectures by the instructor on the legacy of Anglo-Saxon legal notions and the creation of the royal system of justice known as the "eyre", 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 in 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: C.J. Neville

RECOMMENDED: HIST 1100.03, 2104.03

EXCLUSIONS: HIST 3009.03, 3007.03, and 3010.06

CROSS-LISTING: HIST 4004.03

### **HIST 5985.03: The Varieties of History - Historiography in the 20th Century.**

This class will begin with a brief survey of the writing of history from the Middle Ages to the 19th century, and then proceed to an examination of the major schools, approaches, and sub-disciplines within the historical profession in the 20th century. Topics to be

covered include the following: the nature of historical knowledge, historical "relativism", Marxism, the "Annales" school, oral history, psychohistory, quantitative history, Feminism and others. No background in statistics is required. Classes will meet weekly to discuss assigned readings and each student will investigate an historian or historical school of his/her choice for a term paper.

FORMAT: Seminar 2 hours

PREREQUISITE: Concurrent enrollment in HIST 4990.06 or instructor's consent

RECOMMENDED: A class in modern intellectual history of PHIL 2540.06

CROSS-LISTING: HIST 5985.03

\*Non-History MA or PhD students only; history students must take regular classes or one of the Directed Reading fields listed above.

Candidates for the full-time MA in History must take graduate classes in the A (fall) term.

Students from other disciplines may apply for admission to such classes in either the Fall or Winter term (as offered) by seeking the permission of the instructor, and obtaining the approval of their own department and the Faculty of Graduate Studies.

Graduate classes are offered on a rotating basis and students should check with the History Department as to its offerings in a given academic year.

# Human Communication Disorders

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Location: 5599 Fenwick Street  
Halifax, NS, B3H 1R2  
Telephone: (902) 494-7052  
Fax: (902) 494-5151

## Director of the School

Armson, J.

## Associate Professors

Armson, J., BA, MS, PhD (Temple). Stuttering, speech motor control

Caissie, R., BPs, MSc, PhD (McGill). Audiological rehabilitation of adults, hearing aids, hearing loss and aging

Kay-Raining Bird, E., BA, MA, PhD (Wisc). Child language development/disorders, Down syndrome, autism, assessment, intervention

## Assistant Professors

Campbell, M., BSc, MSc, MA (CUNY). Speech/voice characteristics associated with hearing impairment, normal speech development

Cleave, P., BA, MSW, MSc, PhD (Kansas). Specific language impairment, treatment efficacy, phonological disorders

Trudeau, N., BSc, MOA, PhD (Montréal). Augmentative and alternative communication, pediatric neurological language/speech disorders, speech/language development

## Instructors

Comeau, M., BSc, MSc (Dal). Pediatric audiology, central auditory processing disorders

Noel, G., BA, MSc (Dal). Auditory processing disorders, tinnitus/hyperacusis, auditory evoked potential

## Clinical Coordinators

Carey, L., BA, MA (CUNY)

Landry, J., BSc, MSc (Dal)

## Adjunct Professors

Green, W.B., BS, MA, PhD (Syracuse). Aural immittance measures, auditory physiology/pathophysiology, audiometry.

Jiang, T.D., BA, MSc (Lamar). International audiology development.

Mencher, G.T., BA, MA, PhD (Mich), FASHA. Pediatric audiology, hearing disorders, auditory diagnosis

## Adjunct Clinical Professors

Anvar, B., MSc (Dal)

Comeau, M., BSc, MSc (Dal)

Dobbelsteyn, C., BSc, MSc (Dal)

Ellis, P., BSc, MSc (Dal)

Farrell-Walker, T., BA, MSc (McGill)

Gulliver, M., BSc, MSc (Dal)

Hollett, S., BSc, MSc (Dal)

Johnson, S., BSc, MSc (Dal)

Jozsa, S., BA, BEd, MSc (Dal)

MacDonald, A., BSc, MSc (Dal)

MacKay, J., BA, MSc (Dal)

MacLean, H., BSc, MSc (Dal)

Maessen, H., BA, MSc (Dal)

Maxwell, S., BSc, MSc (Dal)

McNeil, S., BA, MA (State U of NY at Buffalo)

Merchant, M., BA, MSc (Dal)

Ough, D., BComm, MA (N.Colorado)

Santilli, C., BChildStudy, MSc (Dal)

Schmidbauer, J., BA, MA (SUNY at Buffalo)

Smith, K., BS, MS (Syracuse)

Smith-Lamothe, J., BSc, MSc (Dal)

Stuttard, S., BSc, MSc (Dal)

Tabor, E., BChildStudies, MSc (Dal)

Whitehead, G., BS, MA (Northern Illinois)

Williams, M., BSc, MSc (Dal)

The School of Human Communication Disorders provides a three year programme of studies and clinical experiences leading to a MSc degree in either speech-language pathology or audiology.

## I. Admission Requirements

All applicants must possess a minimum of a baccalaureate degree from a recognized institution of higher education. This programme is designed for students with either minimal or no previous academic experience in the area of speech-language pathology or audiology. The School invites applications from students possessing a baccalaureate degree in psychology, educational psychology, linguistics, special education, natural science, nursing, health sciences and other behavioural or health-related disciplines. Students whose undergraduate degree is in either speech-language pathology or audiology may be considered for entrance into the programme at a more advanced level under exceptional circumstances only.

### Required Classwork

All student applicants must have successfully completed a minimum of one-semester class in introductory linguistics for admission to the School.

### Recommended Classwork

Preference will be shown to students whose academic background includes at least one class in each of the following four categories:

1. Research methods, e.g., statistics, research design
2. Physical and biological sciences, e.g., anatomy, physiology, physiological psychology, human biology, neurophysiology, physics, acoustics
3. Psychology, e.g., developmental psychology, abnormal psychology, learning theory, motivation
4. Perception and psychophysics, e.g., speech perception, psychoacoustics

Undergraduate grade requirements should exceed the equivalent of a "B" in the student's major and be at least the "B" level overall. 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.

## II. MSc Degree Programme

This degree programme is a three year class with summer practicum experiences at the end of the second year of study. Currently the School does not offer any part time studies.

Students will be required to attain a minimum of 13 credits (10 academic, 1 project or thesis and 2 clinical practicums) over a three year period.

Extensive supervised clinical practice is required throughout the three year programme. Much of this requirement is met by attending a practicum held during the summer months. Students also complete a clinical externship during the winter term of the third year of study.

Students are required to undertake a project in an area of special interest during the second and third years of the programme. Projects provide students with the opportunity to develop specialized skills and are intended to make a contribution to the academic discipline or profession.

A maximum of three students per year may undertake a thesis in place of a 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. Students in the thesis-track have the option of reducing their classload by a maximum of two classes during the second and/or third year of study.

### **Core Curriculum**

While students pursue a class 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 under "core curriculum" in the class listings that follow.

## **III. Classes Offered**

### **Core Curriculum**

#### **HUCD 5050.03: Fundamentals of Speech Science.**

This class is an introduction to speech sciences. It provides an overview of the structure and function of the speech systems as well as exposure to theoretical and research issues in speech physiology. It provides preliminary coverage of basic topics in speech acoustics such as source-filter theory and acoustic correlates of information sources in speech. Finally, it reviews selected experimental phenomena and theories of speech perception.

#### **HUCD 5020.03: Phonetics.**

This class considers the articulatory, linguistic, and acoustic aspects of phonetics. The application of phonetics to communication disorders, and training in broad phonetic transcription are included.

#### **HUCD 5061.03/5062.03/7061.03/7062.03: Practicum.**

#### **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, and immittance measurements. The principles and techniques for audiometric/immittance screening are presented.

#### **HUCD 5130.03: Introduction to Speech-Language Pathology.**

This class is designed to provide an overview of the discipline of speech-language pathology. A description of various pathologies and their management are presented.

#### **HUCD 5140.03: Aural Habilitation with Children.**

This class is designed to familiarize students with the general principles and features of comprehensive 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, phonology 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 covers the structure and function of the peripheral hearing mechanism. Principles of acoustics and the physiological processes of audition are included.

#### **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 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 and 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 products are formally presented, within a conference format, to other students, faculty, and members of the local professional community.

#### **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 5210.03: Speech-Language Analysis.**

This class covers assessment procedures used to evaluate speech, language and related processes in infants through adolescents. Observational and descriptive techniques are emphasized. In addition, standardized clinical measurement is addressed.

#### **HUCD 5250.03: Speech Disorders - Children.**

This class considers speech disorders in children, their development, phonological, perceptual, and neuromotor aspects. Included in the class are the assessment, differential diagnosis, and management approaches related to these disorders.

#### **HUCD 5270.03: Language Disorders - Children.**

This class deals with the nature and management of language disorders in preschool children across clinical etiologies (i.e., mental retardation, autism, hearing impairment, specific language impairment). Theories of language impairments and contemporary treatment approaches are presented.

#### **HUCD 6350.03: Language Disorders - Adults.**

This class covers the description and classification of language disorders of neurologic origin in the adult population. The primary focus is on aphasia but cognitive-linguistic deficits associated with traumatic brain injuries are also reviewed. Clinical diagnosis and management is emphasized.

#### **HUCD 6370.03: Fluency Disorders.**

This class covers the nature and treatment of fluency disorders. A review of the literature concerning the symptomatology of stuttering, theories about the disorder, and the treatment of disfluent children and adults are included.

#### **HUCD 6390.03: Voice/Resonance Disorders.**

This class addresses the contribution of voice and resonance to speech production. It explores the use of clinical measurement tools to assess each and stresses the application of such information to the

assessment, diagnosis and treatment of voice/resonance disorders in children and adults. It covers signs and symptoms used in voice description and differential diagnosis. Treatment approaches are addressed for voice disorders, postlaryngectomy speech, alaryngeal speech, and resonance disorders associated with craniofacial anomaly and neurological deficit.

#### **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 reviewed. The final third of the class focuses on evaluation and management of neurologic swallowing disorders.

#### **HUCD 6460.03: Neurogenic Cognitive-Linguistic Deficits in Adults.**

This class will focus on cognitive-linguistic deficits associated with traumatic brain injury (TBI), right hemisphere cerebrovascular accidents (RCVA), and dementia. Specific topics will include neuropathology, manifestations, assessment, and intervention for these three conditions. Issues of differential diagnosis, as well as cultural differences will also be discussed throughout the class.

#### **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 6610.03: Special Topics in Speech-Language Pathology.**

This class consists of two parts. Part I will cover issues related to assessment and intervention in Augmentative and Alternative Communication (AAC). Part II will cover issue related to assessment and management of dysphagia in neurologically impaired adults.

#### **Audiology Curriculum (above and beyond core)**

#### **HUCD 5220.03: Diagnostic Audiology.**

This class considers the principles and methods of advanced 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 HC636 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 deals with the structure and function of the central auditory nervous system. Special emphasis is placed on the electrophysiological aspects of the mechanism. Methodological considerations of auditory electrophysiology are presented.

#### **HUCD 6070.03: Topics in Audiology Procedures.**

Selective topics relevant to the practice of clinical audiology will be covered, including tinnitus, balance disorders, basic otology, pseudohypacusis, cochlear implant, and cerumen management.

#### **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 class provides students with an overview and understanding of the electroacoustic characteristics and various types of amplification systems. Current methods for selecting and verifying amplification systems for hearing-impaired individuals of all ages are examined.

#### **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.

#### **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 Clinical 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

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Location: Morroy Academic Building  
5269 Morris St.  
HALIFAX, NS  
Telephone: 902-494-3281  
Fax: 902-420-7858  
E-mail: Cindi.Slaunwhite@Dal.ca

## Department Head

Gunn, E.A., BS (MtA), MA (Dal.), PhD (Toronto), PEng. Operations research, inventory and production control, natural resources.

## Professors

Gunn, E.A., BS (MtA), MA (Dal.), PhD (Toronto), PEng. Operations research, inventory and production control, natural resources.  
Sandblom, C.L., Fil.Kand., Fil.Mag. (Lund), PhD (Birm). Modelling & optimization of linear, nonlinear & stochastic systems.

## Research Professors

Barzilai, J., BSc, MSc, DSc, (Technion), Measurement theory, decision analysis, optimization.  
Das, B., BScEng (Banaras), MSc, PhD (North Carolina State), FIIIE, FIEE, CEng, PEng, Industrial ergonomics, workstation design, human strength measurement, anthropometric modelling.

## Associate Professors

Cyrus, J.P., BSc (ENG) (UWI), MAsC, PhD (TUNS), PEng. Vehicle routing & scheduling, production scheduling, employee scheduling, scheduling interfaces.  
Pelot, R.P., BAsC (Ottawa), MAsC (Alberta), PhD (Waterloo), PEng. Risk analysis, aquaculture production management, ergonomics.

## Assistant Professors

Blake, J., BAsC, PhD (Toronto), Industrial engineering, operational research, health applications, simulation.  
He, Q., BSc (China University of Science and Technology), PhD (Chinese Academy of Sciences), PhD (Waterloo), Graduate Coordinator. Operations research, queueing theory, applied probability.

## Lecturer

MacDonald, C., BEng (TUNS), PEng. Work design, manufacturing system.

## Adjunct Professors

Chaudry, M.L., BS, MA (Panjab), PhD (Kurukshetra). Stochastic processes, queues, numerical probability.  
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). Queueing Theory.  
MacKay, K., (Faculty of Business Administration, Memorial University, St. John's, Newfoundland), BMath, MSc, PhD (Waterloo). Production Management, information systems.  
Millar, H., BSc (UWI) MAsC, PhD (TUNS), PEng. Disaster Recovery Planning, Fisheries Operations, Manpower Scheduling, Vessel Routing, Production Operations.  
Worrall, B.M., BSc, PhD (Hull), PEng

## I. Programme Description

See Engineering section for Masters's and Doctoral programme details.

## II. Classes Offered

### IENTG 6900.03: Industrial Engineering Methodologies.

This class gives an overview of the 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.

PRE-REQUISITE: This class is not intended for graduates of an Industrial Engineering Undergraduate Programme.

### IENTG 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.

### IENTG 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.

### IENTG 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.

### IENTG 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.

### IENTG 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 skills in computer programming.

### IENTG 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.

### IENTG 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.

### IENTG 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 programmes, 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.

PRE-REQUISITES: 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 6922.03: Sequencing and Scheduling.**

The class is concerned with analysis of the following sequencing problems: single-machine, parallel identical and different machines, general jobshop and special cases of the jobshop and flow shop under various objective functions and assumptions. Models and algorithms for the basic sequencing problem are formulated.

### **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 will 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 which are widely applied in areas such as telecommunication networks, flexible manufacturing systems, computer performance evaluation and stochastic service systems. These models include priority queues, retrieval queues, assembly line queues, and queueing networks.

PRE-REQUISITES: IENG 6916.03 or equivalent

### **IENG 6946.03: Modelling and Design of Flexible Manufacturing Systems.**

This class provides an overview of the problems of Flexible Manufacturing Systems (FMS). The basic architecture of FMS, which includes machining and gauging stations, robots, transport

systems and computers, is introduced. Scheduling, loading, part selection, planning and monitoring problems are considered. Mathematical models of these problems are formulated and solution algorithms are presented. Various aspects of the design of the FMS information system is also considered.

### **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 programme 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 Ph.D. programme 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.**

# Interdisciplinary PhD Programme

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Location: Faculty of Graduate Studies  
Room 314, Arts & Administration Building  
Halifax, NS B3H 4H6  
Telephone: (902) 494-2485  
Fax: (902) 494-8797  
E-mail: faycohen@is.dal.ca  
Website: www.dal.ca

## Programme Coordinator

Cohen, F., Assistant Dean Interdisciplinary Studies, Faculty of Graduate Studies

## Interdisciplinary PhD

The Interdisciplinary Ph.D. programme 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 programme 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. The programme requires at least two years of full-time study at Dalhousie. Candidates for the programme must have achieved prior academic excellence before making application.

Before making application, prospective students should consult the Assistant Dean of Interdisciplinary Studies in the Faculty of Graduate Studies Office. In addition to transcripts, applications must include three letters of reference, a c.v., a research proposal, verification of the availability of suitable library and other resources, and letters of interest from at least two Dalhousie faculty members. Because the application process is a lengthy one, prospective students are advised to plan a year in advance. Visa students may need even longer. Application for external funding by all eligible applicants is advised. Limited university funding may be available but it is restricted to the first year.

Students considering such a programme must pay particular attention to the following aspects of interdisciplinary doctoral study:

- 1) The responsibility largely lies with the student to organize a unique programme of studies with appropriate faculty members and the Assistant Dean, Interdisciplinary Studies, Graduate Studies.
- 2) The students must hold a first-class honours undergraduate degree and a research Master's degree, or acceptable equivalents.
- 3) The Interdisciplinary PhD is typically heavier in class work than other PhD programmes and frequently takes longer than the normal four or five years to complete.
- 4) The student should plan such studies in the context of an overall career goal to ensure that, as far as possible, the programme will constitute a proper qualification for desired employment upon graduation.

Anyone wishing to pursue the programme should plan it within the framework of the following requirements:

- 1) The student should develop a tentative programme of proposed study, reviewing its various features and ramifications, and making sure that it (a) is truly interdisciplinary, and (b) cannot be completed within the framework of an existing programme.

- 2) The student should discuss the proposed programme with appropriate faculty members and identify the potential supervisor.
- 3) By the end of the first year in the programme, a committee of five faculty members must be established. A student who is a Dalhousie faculty member must have a 6th (external) member on the committee. The committee will be responsible for supervising the student's overall programme 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.
- 4) Application and admission procedures:  
Application forms are available from the Office of the Registrar. Once transcripts, research proposal, letters of reference, and other supporting documentation have been received in the Faculty of Graduate Studies, the file is considered by the Graduate Faculty Interdisciplinary PhD Committee.

Deadline for completed application is January 31.

## Programme Requirements

Preliminary class work will consist of a minimum of 5 half-credit classes chosen from the graduate offerings of the Faculty and may include directed reading classes. During the second year, or no later than the beginning of the third year of the programme, comprehensive examinations must 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. The research proposal must also be presented to and approved by the supervisory committee.

For more information contact the Assistant Dean of Interdisciplinary Studies, Office of the Faculty of Graduate Studies, Dalhousie University, Halifax, Nova Scotia, Canada B3H 4H6. Telephone (902) 494-2485; Fax: (902) 494-8797; E-mail: Graduate.Studies@Dal.Ca.

# International Development Studies

Location: Halifax, NS  
Telephone: (902) 494-3814  
Fax: (902) 494-2105  
E-mail: mmackinn@is.dal.ca  
Website: <http://www.dal.ca/~intd> [www/intdwww.html](http://www.intdwww.html)

## Graduate Co-ordinator

Gardiner Barber, P., MA (Auckland), PhD (Toronto)

Being interdisciplinary in nature and structure, the programme 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 programme.

Please consult individual departmental/school entries for faculty member research interests.

## Faculty

Barkow, J.H. (Sociology & Social Anthropology)  
Benoit, J.L. (Henson College)  
Binkley, M.E. (Sociology & Social Anthropology)  
Bishop, M. (French)  
Black, D. (Political Science)  
Boardman, R. (Political Science)  
Brooks, M. (Business Administration)  
Brown, P. (Public Admin)  
Cadigan, S. (History/Marine Affairs)  
Cassin, M. (Public Administration)  
Chircop, A. (Law/Marine Affairs)  
Cohen, F. (Environmental Studies)  
Dayton-Johnson, J. (Economics)  
Faulkner, C.T. (Comparative Religion)  
Fierlbeck, K. (Political Science)  
Finbow, R.G. (Political Science)  
Gardiner Barber, P. (Sociology & Social Anthropology)  
Guppy, S., (Planning)  
Harvey, F. (Political Science)  
Kindred, H. (Law)  
Kirk, J. (Spanish)  
Lesser, B. (Economics)  
Li, T.J. (Sociology & Social Anthropology)  
Li, V. (English)  
MacLean, D. (Community Health & Epidemiology)  
MacLean, S.J. (Political Science)  
McAllister, R.I. (Economics)  
McIntyre, L. (Health Services Administration)  
McNiven, J. (Business Administration)  
Newkirk, G. (Biology/Lester Pearson Institute)  
Palermo, F., (Planning)  
Parpart, J.L. (History/Women's Studies)  
Patton, D. (Business Administration)  
Pereira, N.G.O. (History & Russian Studies)  
Poel, D. (Public Administration)  
Poulton, M. (Planning)  
Ravindra, R. (Comparative Religion)  
Ricketts, P. (Environmental Studies/Marine Affairs)  
Sagebien, J. (Business Administration)  
Saunders, P. (Law)  
Shaw, T.M. (Political Science)  
Sullivan, K. (Public Administration)  
Thiessen, V. (Sociology & Social Anthropology)  
VanderZwagg, D. (Law)  
Wainwright, J.A. (English)  
Willison, M. (Biology)

Winham, G.R. (Political Science)  
Wood, S. (Resource & Environmental Studies)  
Zachernuk, P. (History)

## Professors Emeriti

Kamra, O.P. (Biology)  
Mann Borgese, E., (International Ocean Institute)

## Adjunct Professors

Dwire, A.  
Kamra, S.  
Pachai, B.  
Sinclair, A.M.  
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 South.**

The programme brings together Dalhousie's considerable resources -- individual, institutional and informational -- in this area in cooperation with compatible offerings at Saint Mary's University (SMU). We offer an innovative degree programme based on established graduate classes in cooperation with the activities of development studies centres on campus, particularly the undergraduate International Development Studies programme 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 Programme and has a limited enrollment of six students per annum.

This degree exists as an interdisciplinary offering with the following requirements:

- i) One-half credit in theory
- ii) One-half credit in methods
- iii) One-half credit in practice
- iv) Out of the six half-credit classes at least two half-credits should be taken in different disciplines
- v) The masters thesis normally counts as two full-year classes;
- vi) Thesis readers are normally drawn from at least two departments; one of the three members committee may come from the SMU programme in IDS or elsewhere.

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 is offering a similar MA, so permitting students from both campuses to take a broader range of offerings. In particular, IDS MA students on both campuses are expected to participate in the weekly Friday noon IDS seminar at SMU. 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 recognized standing, in either International Development Studies or a relevant discipline (normally, but not exclusively, 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.

Only candidates with honours or equivalent in IDS may complete the requirements in a 12-month period of full-time study; i.e. be required to pay only one year of programme fees. However, in most cases completion of the thesis will take more than the 12 month period and will involve payment of thesis -- only fees for any

additional years 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 the annual Halifax Summer School in International Development.

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. Early application is especially recommended for foreign candidates who will need to arrange student visas; i.e. by January 31.

Candidates from outside Canada whose native language is other than English must demonstrate their capacity to pursue a masters programme 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. Programme Requirements

Candidates for the Master's Degree in International Development Studies are expected to complete a class 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 encouraged to take appropriate graduate classes in the Halifax Summer School in International Development towards the end of their year in residence. 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.

### 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

### Community Health & Epidemiology

CH&E 6050.03: Political Economy of Health and Development

### Economics

ECON 5250.06: Applied Development 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  
 ECON 5517.03: Resource and Environmental Economics II  
 ECON 5522.03: Labour I  
 ECON 5523.03: Labour 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

### Health Services Administration

HESA 6370.03: International Comparative Health Care Systems

### History

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 5600.03: Gender and Development.

(\*Normally for qualifying year students only.)

### 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 5316.03: Politics in South Africa  
 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: Third World Foreign Policy  
 POLI 5585.03: Politics of the Environment

### Public Administration

PUAD 6500.03: Business & Government  
 PUAD 6520.03: Programme Evaluation Seminar  
 PUAD 6521.03: Programme Evaluation Practicum  
 PUAD 6550.03: Design & Use of Projects  
 PUAD 6555.03: Technology & Public Administration  
 PUAD 6620.03: Women, Men & Management

### Social Work

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  
SOSA 5530.06: IDS through Shastri Summer Institute in India

#### **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

#### **Women's Studies**

WOST 6010.03: Theories of Feminism  
WOST 6020.03: Feminist Methodologies

## **Internetworking**

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Location: Internetworking Programme  
Dalhousie University  
Office B223  
1360 Barrington Street  
HALIFAX, NS  
B3J 2X4  
Telephone: 902-494-2053  
Fax: 902-494-2057  
E-mail: [internet.eng@dal.ca](mailto:internet.eng@dal.ca)  
Website: <http://www.dal.ca/internetworking>

#### **Programme Director**

Robertson, W., BSc (Hons), MSc (Aberdeen), PhD (TUNS), PEng

#### **Instructors**

Bodorik, P., BSc (Calgary), MEng, PhD (Carleton)  
Cyrus, J.P., BSc (Eng) (UWI), MSc, PhD (TUNS), PEng  
Dupuis, D.J.P., BSc (Moncton), MSc (Queen's), PhD (UNB)  
Fenton, G.A., BEng, MEng (Carleton), MA, PhD (Princeton)  
Hitchcock, P., MA (Oxford), PhD (Warwick)  
Hughes, F.L.K., BSc (CompSci) (Carleton), MSc, PhD (Newcastle upon Tyne)  
Illow, J., BSc (Poland), MSc, PhD (Toronto)  
Phillips, W.J., BSc (Eng), MSc (Queen's), PhD (UBC)  
Sivakumar, S.C., BEng (Bangalore), MSc, PhD (TUNS)  
Srinivas, 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 programme is truly unique being the result of a partnership between Dalhousie, Cisco Systems Inc., Maritime Tel and Tel (MTT), and with the support of the Telecomm Applications Research Alliance (TARA). The programme 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. The laboratory and the classroom are on site at the TARA location and are adjacent to the Cisco Certified Cisco Internetworking Expert (CCIE) testing laboratory (of which there are only three in North America). The location of the laboratory provides unique benefits to the programme.

### **II. Programme Classes**

The classes and their order of presentation are continually under review and are shown here as they were at the time of going to press. The latest content and order of presentation are updated regularly on the web page. The project commences in Term 3 and will normally require continuation into at least a fourth term.

**NOTE:** Completion of any or all software 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 5101.03: 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 5102.03: 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 5103.03: 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 5104.03: Internet Communication Protocols.**

This class provides an in-depth coverage of the Transmission Control Protocol/Internet Protocol (TCP/IP) protocol stack 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 5105.03: 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 5106.03: ATM Traffic Management and Internetworking.**

This is an introductory class to the Synchronous Transfer Mode (ATM) technology. It covers the status of various ATM standards, including basic functions of the physical layer, the ATM layer, and the ATM Adaption layer; basic functions of ATM traffic management; and various techniques to Internetwork existing LAN and network layer protocols with ATM.  
EXCLUSION: EINE 5106.03

### **INWK 5107.03: 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.  
FORMAT: Lecture 3 hours, lab 2 hours

### **INWK 5108.03: Network Security and Management.**

This class will give the student a broad coverage of the two areas of network security and management which are critical in internetworking. Security topics include security threats; attacks and breaches; security goals, mechanisms and technologies; Internet cryptography; encryption, authentication, certification and

key management; firewall products and design; tunneling mechanisms; security protocols; and issues for network design. Development, and troubleshooting. Management topics include network planning and design; network management protocols; troubleshooting; and monitoring and managing network performance.  
FORMAT: Lecture 3 hours, lab 2 hours

### **INWK 5201.03: 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 5202.03: Simulation Modeling and Analysis.**

This class includes discrete event simulation, continuous simulation modeling complex systems, simulation software, comparing alternative system configurations, variance reduction techniques, experimental design and optimization, simulation of data networks.  
EXCLUSION: EINE 5202.03

**NOTE: Some students may be required to take INWK 5301.03 and INWK 5302.03 in addition to the regular (10) programme classes.**

### **INWK 5301.03: Circuit and Signal Theory for Internetworking.**

This class covers introductory Boolean algebra and digital logic; elementary circuit analysis using phasors and complex impedance techniques; Fourier series, Fourier Transforms, time-bandwidth product, the frequency domain representation of signals, impulse response and system transfer functions, sampling theorem and Nyquist criterion, A/D and D/A conversion and pulse code modulation; principles of analog communications including amplitude, frequency and pulse modulation, frequency division multiplexing; elements of probability theory as applicable to analysis of noise in lowpass and bandpass systems.  
EXCLUSION: EINE 5301.03

### **INWK 5302.03: Programming for Internetworking Applications.**

Topics covered include objects, stacks, queues, simple and multiple linked lists, searching and sorting algorithms, and their implementation in the C++ programming language. The students implement signal analysis and message passing applications related to internetworking, while learning to design structured programs.  
EXCLUSION: EINE 5302.03

### **INWK 5401.03: Real-time OS & Platform Architectures.**

Real time operating systems (RTOS) requirements are covered. Topics include message queuing, resource sharing, priority assignments, event glags interrupts, memory allocation, and typical RTOS configurations. Examples in engineering and networking will be discussed. Internetworking platform architectures will be covered (caching, hardware/software performance measurement). A significant implementation-design and implementation project will be undertaken.  
EXCLUSION: EINE 5401.03

### **INWK 5901.03: Project/Case Study.**

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

# Law

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Location: Weldon Law Building  
6061 University Avenue  
Halifax, NS B3H 4H9  
Telephone: (902) 494-3495  
Fax: (902) 494-1316  
Website: www.dal.ca/~wwwlaw/graduatestudies

## Dean, Faculty of Law

Russell, D.A., BA (St. Thomas), MA, LLB (Dal), LLM (Cambridge)

## Associate Dean

Scassa, T., BCL, LLB (McGill), LLM, JSD (Mich). Violence against women, human rights, intellectual property.

## Professors Emeriti

Charles, William H., Q.C., BA (Sir Geo Wms), LLB (Dal), LLM (Harvard), LLM (Mich)  
MacDonald, R.St.J., QC, BA (StFX), LLB (Dal), LLM (London), LLM (Harvard), LLD (McGill)  
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.  
Christie, I.M., BA, LLB (Dal), LLB (Cantab), LLM (Yale). Law, Labour Relations, Arbitration, Occupational Safety, Worker's Compensation, Legal Ethics  
Devlin, R.F., LLB (Queen's, Ireland), LLM (Queen's, Ont). Jurisprudence, Legal Ethics, Judicial Education, Judicial Ethics, Socio-legal  
Girard, P.V., BA (Brock), LLB (McGill), LLM (Cal, Berkeley). 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  
Thomas, P., LLB (Wales), LLM (Yale). Family, Divorce, Fostering, Separation, Children, Contracts, Banking, 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), James Robinson Johnston Chair in Black Canadian Studies. 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). Environmental Law  
Wildsmith, B.H., BSc (Guelph), LLB (Dal), LLM (Harvard). Indian Treaty Rights, Aboriginal Rights, Constitutional Law, Administrative Law  
Woodman, F.L., BA (Dal), LLB (Queen's). Tax and Social Policy, especially regarding Women and Children, Estates and Trusts

Yogis, J.A., QC, BA (SMU), LLB, LLM (Dal), LLM (Mich). Contracts, Law of Succession (Wills), Human Rights Law, Sexual Orientation matters

## Associate Professors

Bankier, J.K., BA (Toronto), LLB (Osgoode). Women and the Law, Law and Technology, Intellectual Property  
Chircop, A.E., BA, LLB, LLM (Malta), JSD (Dal). Marine and Environmental Law and Policy, Coastal and marine Management, Education and Training  
Evans, K., LLB (Dal), LLM (Sydney). Corporate law, oil and gas, commercial law.  
Evans, R.L., BA (Toronto), LLB (York)  
Gibson, E., LLB (Sask.), LLM (Toronto). Family Law, Tort Law, Dalhousie Legal Aid Service  
Pothier, D., BA (Dal), MA (Carlton), LLB (Queen's). Constitutional, Labour, Human Rights, Equality and Disability Issues  
Russell, D., BA (St. Thomas), MA, 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  
Scassa, T., BCL, LLB (McGill), LLM, JSD (Mich.). Violence against Women, Human Rights, Intellectual Property

## Assistant Professors

Aylward, C., BA, LLB, LLM (Dal). Criminal Law, Critical Race Theory, Litigation, Legal Ethics  
Bergin, Fiona, BA (Dal), LLB (Queen's), MD, LLM (Dal)  
Coughlan, S.G., BA (Ottawa), MA (Toronto), LLB (Dal), PhD (Toronto)  
Deturbide, M., BSc (Dal), BJ (King's), LLB (Dal). Corporate Law, Commercial Law, Media Issues, Entertainment Law, Environment and Business  
Downie, J.G., BA, MA (Queen's), MLITT (Cambridge), LLB (Toronto). Health Law; Policy & Ethics; Legal Ethics; Constitutional Law  
Ginn, D., BA (MtA), LLB (Queen's), LLM (Osgoode). Property Law, Administrative Law, Gender, Health Law  
Murphy, R.A., BA (UPEI), LLB (Dal), LLM (Toronto), JSD (Harvard)  
Nicholls, Christopher, BA (Ottawa), LLB, LLM (Osgoode), MPA (Harvard)

## Adjunct Professors

Gold, Edgar, Q.C., BA, LLB (Dal), PhD (Wales), Dipl h.c. (CCGC), MCIT, FNI, FOI, Master Mariner FG (UK & Canada)  
Harris, Edwin C., Q.C., BComm, LLB (Dal), LLM (Harvard), RIA, CA  
Johnston, Douglas M., LLB (St. Andrews, Scotland), LLM, JSD (Yale)  
Mann Borgeesse, Elisabeth, O.C., BA (Freis), Hon. PhD (MSV), Hon. PhD (Dal)  
Trakman, L., BComm, LLB (Cape Town), LLM, SJD (Harvard)

## I. Degree Programmes

### A. Master of Laws (LLM)

A graduate programme in law leading to the Master of Laws degree is offered to well-qualified candidates by the Faculty of Law of the University. The programme is primarily intended for prospective law teachers and professional specialists. The programme 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 programme 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 substantial 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 criminology, family law, health law, law of the sea, maritime law, and environmental law. The Law faculty's academic plan recognizes the Law School's particular research capacity in the areas of public law and feminist legal scholarship. A particular interest has been developed in marine and environmental law which has been

designated as a field of special emphasis in the Faculty of Law. The Sir James Dunn Law Library collection for the Marine and Environmental Law Programme is now one of the best in North America. In addition graduate work is being done under the aegis of the Health Law Institute which is a joint initiative of the Faculties of Law, Medicine, Health Professions and Dentistry. Moreover, the Faculty of Law has a specialized programme for graduate students in the area of Family Law.

### 1. Admission Requirements

Applicants for admission to the LLM programme 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 at an average of not less than B, with no grade below B-. Graduate students taking classes which 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, which is led by a senior teacher in the Faculty of Law, 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. These are usually supervised by a two person committee comprised of a supervisor and a reader or, in certain circumstances, two co-supervisors. These 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.

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 programmes 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 programmes 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 programme 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 four subject areas:

- (i) Marine Law
- (ii) Environmental Law

These areas of the curriculum have been designated as a priority development by the Faculty of Law since 1974. As a result, considerable faculty expertise, library holdings, research projects and class offerings in these areas has been created. Consequently, the Faculty's Marine and Environmental Law Programme has achieved international prominence.

- (iii) International Law
- (iv) Comparative Law

These areas of specialization have grown with seminars in comparative criminal law, comparative constitutional law, and international human rights law.

### 1. Admission Requirements

Applicants for admission to the JSD programme 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 programme. 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 programmes 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**

Candidates for the JSD degree may be required by the Graduate Studies Committee of the Faculty of Law, on the recommendation of their thesis committee, to carry out advanced class work in the area of their thesis, or in a cognate area of a more general field of law, or in a discipline other than law, which is deemed to be highly relevant to their thesis topic. When undertaking such class work, JSD candidates must obtain an average standing of at least B<sup>-</sup> in all classes designated as "required by the thesis committee", with no grade falling below B. A student who fails to meet these requirements is automatically dropped from the programme, but may apply for readmission immediately.

## **4. Preliminary Examination Requirements**

Each candidate will also be required to pass a preliminary examination normally at the end of their first year of residence, and not less than 1 year before submitting the thesis. The preliminary examination may be oral, written, or both, at the discretion of the Graduate Studies Committee, and will cover the subjects relevant to the general area of the candidate's research. Failure to pass this examination may result in dismissal. However, the student may be permitted to repeat the examination within the subsequent 12 (twelve) months. (For greater detail see the Dalhousie Law School "Guidelines for Preliminary Examinations - JSD Candidates").

## **5. 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.

## **6. 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 programme. Submission of the thesis must follow the rules and regulations laid down by the Faculty of Graduate Studies.

## **7. 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.

## **8. 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/~wwwlaw/graduatestudies](http://www.dal.ca/~wwwlaw/graduatestudies)

# Library & Information Studies

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Location: Killam Library  
6225 University Avenue  
Halifax, NS B3H 3J5  
Telephone: (902) 494-3656  
Fax: (902) 494-2451  
E-mail: slis@is.dal.ca  
Website: <http://www.mgmt.dal.ca/slis>

## Director of School

MacDonald, B.H.

## Administrative Staff

Dunn, J., Programme/Graduate Coordinator  
Balogh, S., Administrative Assistant  
Dehmel, L., Secretary

## Professors Emeritus

Dykstra Lynch, M., BA (Calvin), MLS (Dal), PhD (Sheffield)  
Ettlinger, J.R.T., MA (Oxon), BLS (McGill)  
Horrocks, N., BA (Western Australia), MLS, PhD (Pittsburgh),  
Fellow of the Library Association (UK), Associate of the  
Library Association of Australia

## Associate Professors

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.

## Assistant Professors

Julien, H., BEd (Alberta), MLIS (Alberta), PhD (UWO). Information behaviour, information literacy.  
Spiteri, L., BA, MA (York), BEd (Toronto), MLIS (UWO), PhD (Toronto). Thesaurus construction, classification, indexing.

## Lecturers

Howard, V., BA, MA (UBC), MLIS (Dal). Literature for children, literature for young adults, information behaviour.  
Moukdad, H., BA (Lebanese Univ), MA (Boston), MLIS (McGill), PhD Candidate (McGill). Information retrieval, multimedia development, multilingual web searching.

## Adjunct Professors

Beaumont, J., BSc (Carleton), Associate of the Library Association (UK)  
Rosenthal, E., BA (Queen's College of CUNY), MSc (Syracuse), PhD (DalTech)  
Vagianos, L.G., BA (Hiram College), MA (Suffolk), MSLS (Western Reserve), LLD (UPEI)

## Associated Instructional Staff

Speirs, W., Brian, BA, MA (Windsor)  
Sutherland, J.E., BA (Alberta), MLS (Dal)

Students seeking further information or help in planning classes of study in the School of Library and Information Studies should contact:

Graduate Coordinator  
School of Library and Information Studies  
Room 3621, Killam Library  
Dalhousie University  
Halifax, NS B3H 3J5

The goal of the School of Library and Information Studies is to provide graduate education within the Atlantic Provinces to qualified candidates which equips them for their first and subsequent positions as information professionals. This will be accomplished by exposing students to the theories, technologies and practices which comprise library and information studies. Within the programme, the local professional community is provided with opportunities to acquire new skills and career directions.

The student is introduced to the development and significance of librarianship and related information fields, 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

Candidates must hold a Bachelor's Degree with at least a second class standing from a university recognized by the Senate of Dalhousie University.

All applicants are urged to submit completed documentation early in the year as this is a limited enrollment programme; many more applications are received than there are places to be allotted.

The School admits students in September and January. The majority of students enter in September and the programme is designed primarily for fall admission.

Candidates whose native language is not English must submit a TOEFL score according to the regulations set out in the Faculty of Graduate Studies regulations section of this calendar.

The School's booklet, *Information for Prospective Students*, which describes the programme in detail, is distributed to all applicants. Contact the school for a copy if one is not received with the application package.

## II. Degree Programmes

### 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 (8 required, 8 electives)
2. A practicum (i.e. work placement of 100 hours)

In addition, students are required to attend the scheduled lecture series given by visiting experts in library, information and publishing fields.

#### 1. Two-Year Programme

Full-time attendance during the Fall and Winter terms of two years.

#### 2. Part-Time Programme

The degree is to be completed within six years. The School requires that a part time student take a minimum of two "required" classes during the first term of the programme.

### B. Master of Library and Information Studies/Bachelor of Laws (LLB/MLIS)

This is a four-year programme leading to the degrees of Bachelor of Laws and Master of Library and Information Studies. The usual order of the programme is:

Year 1: first year classes of the MLIS programme (7 required, 1 elective)

Year 2: First year classes of the LLB programme

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 programme must also satisfy the entrance requirements of the Faculty of Law. For further information, contact the Graduate Coordinator, School of Library and Information Studies and/or the Admissions Officer, Faculty of Law.

### **C. Master of Library and Information Studies/ Master of Business Administration MLIS/MBA**

Three year programme leading to the degrees Master of Library and Information Studies and Master of Business Administration. Approval pending. For further information, contact the Graduate Coordinator, School of Library and Information Studies and/or the Graduate Coordinator, School of Business Administration.

### **D. One Year Master of Library and Information Studies (MLIS)**

Applicants will be considered for a special programme, if they meet the requirement of the Faculty of Graduate Studies by possessing "an honours undergraduate degree in the same field as their graduate programme," i.e. BLS (Honours) or, in the opinion of Faculty, an equivalent qualification.

## **III. Classes Offered**

In the following list the required classes are numbered 0590, 5500-5580. 6000 and 0600 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.

If a student chooses as an elective a class offered by a department other than the School of Library and Information Studies, approval must be obtained from the head of the relevant department and the School.

#### **LIBS 0590.00: Practicum.**

The work placement 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 Graduate Coordinator. (100 hours, Non-credit)

Exemption may be granted when a student enters the MLIS programme with at least four months (500 hours) of relevant employment experience which has been supervised by an information professional acceptable to the School, or if the equivalent of four months of suitable employment is gained while attending the School (either throughout the academic years or as a summer job between the first and second year of study).

#### **LIBS 0600.00: Letterpress Printing.**

#### **LIBS 0640.00: Handbound Books I.**

#### **LIBS 0650.00: Handbound Books II.**

#### **LIBS 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: B. MacDonald

#### **LIBS 5505.03: Information Systems and Technology.**

Provides a foundation in information technologies, both hardware and software, and their application in contemporary organizations. Additionally, it examines some of the key ethical and social issues of societal use of information technologies.

INSTRUCTOR: H. Moukdad

#### **LIBS 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; relation of organization to information retrieval systems. Traditional, library-oriented and more recent computer-based techniques, tools, and theories are examined.  
INSTRUCTORS: L. Spiteri

#### **LIBS 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: H. Julien

#### **LIBS 5530.03: Information Sources & Retrieval.**

Introduces the philosophies and techniques of reference work. Focuses on theories of information behaviour, and effective communication with clients in the reference interview; the tools of reference, both print and electronic; and basic techniques of online searching.

INSTRUCTOR: H. Julien

#### **LIBS 5540.03: Database Management Systems.**

An introduction to the analysis of data requirements and implementation of systems by means of a database management system. Provides an understanding of data modelling and file structures.

INSTRUCTOR: H. Moukdad

CROSS-LISTING: BUSI 6516.03

#### **LIBS 5570.03: Organizational Management & Strategy.**

An introduction to the current state of management practice and strategy. Examines organizational theory and design, organizational environments and cultures, organizational communications, group and individual behaviour and motivation, decision making, planning, leadership, organizational effectiveness and control, and change management.

INSTRUCTOR: N. Horrocks

#### **LIBS 5580.03: Systems Analysis.**

Introduces knowledge skills and techniques necessary for describing, analyzing requirements, and designing the user-oriented aspects of information-technology-supported systems in libraries, businesses and similar organizations.

INSTRUCTOR: E. Rosenthal

CROSS-LISTING: BUSI 6514.03

#### **LIBS 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 cultural or ethnic groups.

INSTRUCTOR: N. Horrocks

#### **LIBS 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: L. Spiteri

#### **LIBS 6250.03: Young Adult Literature and Media Interests.**

Introduces the social, intellectual and psychological nature of adolescence, with respect to reading, listening and viewing interests.

INSTRUCTOR: V. Howard

#### **LIBS 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.  
INSTRUCTORS: B. MacDonald

**LIBS 6330.03: Cataloguing and Classification.**

Looks at the application of standards and rules to the construction of catalogues. The first half of the term 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: L. Spiteri

**LIBS 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, abstracting, and automatic indexing and abstracting.  
INSTRUCTOR: L. Spiteri

**LIBS 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: L. Spiteri

**LIBS 6450.03: Children's Literature and Media Interests.**

An introduction to books and other materials for children. An attempt is made to relate these materials to the social, intellectual and psychological nature of childhood.  
INSTRUCTOR: V. Howard

**LIBS 6500.03: Users and Services.**

Examines the ways in which services can be developed in response to user needs and preferences. Introduces the methods and tools used in community analysis and service evaluation, and explores management issues related to the design and implementation of facilities and services.

**LIBS 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: V. Howard

**LIBS 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: B. MacDonald

**LIBS 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.

**LIBS 6610.03: Information Policy.**

Provides the opportunity to critically analyze a number of issues facing information professionals in the information society. Examines the roles of the public, private, and not-for-profit sectors in developing information policy, and explores the problems that give rise to information policies.  
INSTRUCTOR: H. Julien

**LIBS 6630.03: Human Computer Interaction.**

Examines how computer interfaces can be designed to minimize user difficulties and maximize the acceptability, effectiveness and efficiency of the application. The emphasis will be placed on information-based applications.

**LIBS 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: L. Spiteri

**LIBS 6650.03-6680.03: Academic Classes.**

These are available by arrangement with the Director.

**LIBS 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.

**LIBS 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.  
INSTRUCTORS: Staff of Kellogg Health Sciences Library

**LIBS 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: B. Speirs

**LIBS 6810.03: Information Literacy.**

Prepares students for the theoretical and practical aspects of educating clients in information research skills. Concepts covered will relate to the design, implementation, and evaluation of instructional programmes.  
INSTRUCTOR: H. Julien

**LIBS 6820.03: Marketing.**

Focuses on the theory and techniques of marketing, paying particular attention to non-profit and services marketing. General marketing literature as well as published material in our own field are used to introduce marketing concepts, and identify examples of best practice.  
INSTRUCTOR: H. Julien

**LIBS 6830.03: Information Retrieval.**

An overview of information retrieval emphasizing current research and current developments. Both search engines and the interface are explored with an emphasis on evaluation and user testing.  
INSTRUCTOR: H. Moukdad

**LIBS 6840.03: Automation and Networking.**

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: H. Moukdad

**LIBS 6850.03: Special Topics in Information Management.**

Builds on topics introduced in required classes, 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: H. Moukdad

### **LIBS 7320.03: Legal Literature and Librarianship.**

An introduction to the major sources of Canadian legal information, and the fundamental principles, issues, and practices in law librarianship.

### **LIBS 7340.03: Sources 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.

### **LIBS 7390.03: Quantitative Methods.**

Introduces students to basic techniques used to conduct quantitative research and the procedures for applying them. It also provides the background by which students may understand and apply quantitative research methods, with concentration on the application of statistical techniques to the analysis of research data.  
INSTRUCTOR: H. Moukdad

### **LIBS 7600.03: Entrepreneurship.**

Explores the possibilities for information services as entrepreneurial activities, and conveys the practical aspects and personal characteristics of entrepreneurship.

### **LIBS 7620.03: Electronic Text Design.**

Examines the techniques and processes used to create, structure, and deliver electronic text and the implications of the resulting product 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.

### **LIBS 9000.00: Thesis.**

Available by arrangement with the Director. The Thesis Option replaces four of the School's electives.

### **School Publications**

- *Information for Prospective Students* (annual)
- *Newsletter* (annual)
- Occasional Papers Series (Contact the School for a list)
- *YA Hotline* (Irregular)
- *Épilogue*: Canadian Bulletin for the History of Books, Libraries, and Archives

## **Marine Affairs Programme**

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Location: 1234 Seymour Street  
Halifax, NS B3H 3J5  
Telephone: 902-494-3555  
Fax: 902-494-1001  
E-mail: Marine.Affairs@Dal.ca  
Website: <http://www.dal.ca/mmm>

### **Coordinator**

Chircop, A., LLD (Malta), LLM, JSD (Dal)

### **Teaching Faculty**

- Brooks, M., BOT (McGill), MBA (Dal), PhD (Wales), Major appointment with the School of Business Administration. International marketing, international transportation & distribution, strategic management of international operations
- Cadigan, S., BA, MA, PhD (MUN), Junior Chair (Social Science) Ocean Studies, Assistant Professor, Department of History. Coastal communities' society and ecology; Atlantic Canadian fisheries; maritime labour
- Côté, R., BSc (Loyola), MSc (Memorial), Major appointment with Resource & Environmental Studies. Marine environmental protection strategies; management of chemical hazards; industrial ecology
- Lane, P.A., MSc (SUNY Binghamton), PhD (SUNY Albany), Major appointment with Biology. Environmental impact/risk assessment; qualitative structure of perturbed communities; bioremediation
- Mann Borgese, E., OC, DipMus (Zurich), LHD (MSVU), Professor Emeritus, Department of Political Science
- McAllister, R.I., MA (Oxon), MA (Cantab), Major appointment with Economics. Disaster relief, prevention & development; sustainable development & foreign aid; regional development in industrial nations
- McConnell, M.L., BA (Victoria), LLB (Dal), PhD (Sydney), Major appointment with Law. Corporate governance; international, environment; feminist theory; trade; law of the sea; reproductive control
- Newkirk, G.F., PhD (Duke), Major appointment with Biology. Community-based coastal resource management in developing countries; integration of fisheries & aquaculture as a food production system
- Saunders, P.M., BA, MA, LLB (Dal), Major appointment with Law. Canadian environmental law, international law; law & development assistance; law of the sea
- Taggart, C.T., BSc, MSc, PhD (McGill), Major appointment with Oceanography. Fisheries oceanography (field and lab), physical, ecological, biochemical and genetic influences on early life history and recruitment in fish, molecular genetic applications to fish population structure, physiological cycles in fish, predictive relationships between water mass structure and zoo- and ichthyoplakton fields, physical/biological relationships at oceanic fronts
- VanderZwaag, D., BA (Calvin), MDiv (Princeton), JD (Arkansas), LLM (Dal), Major appointment with Law. International Environmental Law, Marine Law, Pollution Control, Fisheries Management, Law of the Sea
- Willison, J.H.M., PhD (Nottingham), Major appointment with Biology. Nature Conservation (marine & terrestrial) policy & practice; plant stress physiology
- Wood, K.S., BA, MA (Oregon). Environmental/ecological economics; resource systems & economic instruments for environmental management, environmental education

## Adjunct Professors

Day, D., BA, Dip Ed, PhD (Sheffield), Professor Emeritus of Geography, Saint Mary's University  
Dwire, A., BA, MA (Dal), Aquaculture development in Maritime Canada; coastal & ocean management, Strategic Environmental Assessment  
Hatcher, B.G., BScH, MSc (Dal), PhD (Sydney)  
Hertzman, O., BAsC, MSc, PhD (Wash), Adjunct Professor, Department of Oceanography  
Hildebrand, L.P., BScH, MEd (Dal)  
Meltzer, E., LLB, LLM (Wash)  
Wells, P.G., BSc (McGill), MSc (Toronto), PhD (Guelph), Adjunct Professor, Resource and Environmental Studies  
Williamson, H., BSc, BEd, LLB, MBA (Dal)

## Associate Faculty

MacLellan, D.P., BA (Dal), APR

Marine Affairs is an interdisciplinary programme examining all aspects of the uses of the coasts and seas. The Master of Marine Management provides a theoretical and practical interdisciplinary basis for understanding coastal and ocean development, planning and regulatory issues affecting the optimal use of the seas and marine industries.

## I. Master of Marine Management

The Master of Marine Management (MMM) is a one-year, professional, non-thesis, interdisciplinary degree. Students are expected to take required classes covering the marine and social sciences, as well as a number of electives from approved marine-related classes. Students are also required to prepare a graduate project.

### Admission Requirements

Enrollment is limited. Applicants must satisfy general requirements for admission to the Faculty of Graduate Studies. These include a Bachelor's Degree from a university of recognized standing with honours or its equivalent with a minimum average of B (73%, GPA of 3.0 or second class honours, Upper Division). Selection criteria include relevant work experience and career objectives. Applicants from outside Canada whose native language is not English must also submit a Test of English as a Foreign Language (TOEFL) score, its equivalent, or have completed a university degree in English. Dalhousie sets a minimum acceptable TOEFL score of 580 (computerized TOEFL score of 237). Deadlines for applications are January 31 for applicants requesting financial assistance, and February 28 for all other applicants.

## II. Classes Offered

### 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: A. Chircop

#### 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. The practical

component allows students to participate in an internship period with a local public or private sector agency of relevance to the project topic.

#### MARA 5003.03: Marine Science and Technology.

This class provides a general introduction to the marine sciences and technology. Subject areas addressed include physical, chemical, and biological oceanography, coastal zone, aquaculture, climate and ocean weather, remote sensing, toxins, fisheries, and ocean technology and management. Instructors come from Halifax universities, government agencies and the private sector.

#### MARA 5004.00: Communications Management.

This class develops skills of marine managers for handling information and communications, including crisis management, with decision-makers and various stakeholders in ocean development and management processes such as special interest groups, the media, business interests, and the public at large.

INSTRUCTOR: D.P. MacLellan

### B. Electives

Students select the remaining complement of classes from the broad range offered in the marine field at Dalhousie and St. Mary's University.

#### 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 Coordinator 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: 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 addresses 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 are used to present practical approaches to the management of multiple uses in the coastal zone, including community-based management models.

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: 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 practice. The holistic approach marries fundamental ecological research, fisheries science, park management and social policy. Most applications have been in the tropics where effective tools for conservation of marine resources are urgently needed, but MPAs are planned for virtually every maritime country. Criteria and information requirements for the selection, establishment and adaptive management of MPAs are evolving on many fronts. Broadly interdisciplinary approaches are required. Professionals in marine affairs need to be aware of the state of the art in MPA theory, design and operation. That is the goal of this class.

INSTRUCTOR: B.G. Hatcher

PREREQUISITES: ENVI 5047.03 or equivalent background or experience

# Mathematics and Statistics

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Location: Chase Building  
Halifax, NS B3H 3J5  
Telephone: (902) 494-2572  
Fax: (902) 494-5130  
e-mail: mscs@mathstatdal.ca  
Website: <http://www.mathstat.dal.ca>

## Chairperson of the Department

Nowakowski, R.J.

## Professors Emeriti

Edelstein, M., MSc (Jerusalem), DSc (Technion-Haifa)  
Swaminathan, S., MA, MSc, PhD (Madras)

## Professors

Clements, J.C., MA (UBC), PhD (Toronto)  
Coley, A.A., PhD (London), Killam Professor  
Field, C.A., MSc, PhD (Northwestern)  
Gabor, G., MSc, PhD (Eotvos)  
Grunenfelder, L., PhD (ETH Zurich)  
Gupta, R.P., MSc (Agra), PhD (Delhi)  
Hamilton, D., MA, PhD (Queen's)  
Keast, P., PhD (St. Andrews)  
Moriarty, K., MSc (Dal), PhD (Imp. Coll.)  
Nowakowski, R.J., MSc, PhD (Calgary)  
Paré, R., MSc, PhD (McGill)  
Stewart, P.N., MA (Berk), PhD (UBC)  
Sutherland, W.R.S., MSc, PhD (Brown)  
Tan, K.K., PhD (UBC)  
Thompson, A.C., PhD (Newcastle upon Tyne)  
Thompson, K., PhD (Liverpool) (NSERC University Research Fellow) (jointly with Oceanography)  
Wood, R.J., MSc (McMaster), PhD (Dal)

## Associate Professors

Brown, J., MSc, PhD (Toronto)  
Johnson, K.P., MSc (Toronto), PhD (Brandeis)  
Ruan, S., PhD (Alta)  
Sastri, C.C.A., MSc (Andhra), PhD (NY)  
Smith, B., MA (Calgary), PhD (Berk)  
Watters, C.R., PhD (TUNS) (cross-appointment with Computer Science)

## Assistant Professors

Bowen, K., PhD (California)  
Janssen, J.C., MSc (Eindhoven), PhD (Lehigh)  
Milson, R., MSc, PhD (McGill)  
Susko, E., PhD (Waterloo)

## Postdoctoral Fellow

Butler, K., PhD (Simon Fraser)

## Killam Fellow

Liu, W.-J., PhD

## Honorary Adjunct Professors

Almudevar, A., (SMU)  
Archibald, T. (Acadia)  
Astatke, T., PhD (Queens), NS Agricultural College  
Beattie, M.A., PhD (Queen's), Mount Allison University  
Dawson, R., PhD (Dal), Saint Mary's University  
Fillmore, P.A., MSc, PhD (Minn), FRSC

Gupta, R., PhD (Dal), University of New Brunswick  
Hartnell, B., PhD (Wat), Saint Mary's University  
Hines, P.C., BSc (Dal), PhD (Bath), DREA  
Hutt, D. (DREA)  
Muir, P., PhD (Toronto), Saint Mary's University  
Noor, M.  
Piccinini, R., PhD (Wisconsin), University of Milan  
Radjavi, H., MA, PhD (Minn)  
Rosebrugh, R., PhD (Dal), Mount Allison University  
Spiteri, R. (Acadia)  
Van den Hoogen, R., PhD (Dal), St. Francis Xavier University

Information concerning programmes and classes in Mathematics follows immediately. For information on programmes and classes in Statistics and Computer Science (including Computing Science) please refer to these sections of this calendar.

# Mathematics

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Location: Chase Building  
Halifax, NS B3H 3J5  
Telephone: (902) 494-2572  
Fax: (902) 494-5130  
E-mail: mscs@mscs.dal.ca

## Chair of Department

Nowakowski, R.J.

## Director of Division

Thompson, A.C.

## Graduate Co-ordinator

Keast, P.

The department offers programmes leading to the degrees of MSc and PhD in the following areas: algebra, approximation theory, category theory, convex geometry, differential equations, functional analysis, graph theory, number theory, numerical analysis, operator theory, optimization, 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 recognized 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 Programmes

### 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 programme 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 programme.

2. Comprehensive examinations which must be taken for the first time within 12 months and successfully completed within 16 months of registration in the programme.
3. Attendance and participation in an appropriate seminar.
4. A demonstration of reading competence in one of the following languages: French, German, Russian.
5. Preparation and defence of a satisfactory research thesis.

NOTE: Students interested in pursuing a degree programme 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 5350.03
- MATH 5400.03
- MATH 7400.03
- One of STAT 5080.03, STAT 5370.03, or STAT 5620.03

## III. Classes Offered

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 Lebesgue spaces, Fourier series.

FORMAT: Lecture 3 hours

PREREQUISITE: MATH 3500.06

CROSS-LISTING: MATH 4010.03

### MATH 5015.03/4015.03: Advanced Linear Algebra.

#### \*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 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 5065.03/4065.03: Algebraic Geometry.

### 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 arithmetic 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 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 5130.03/4130.03: Analysis of Algorithms.****\*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 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  
 PREREQUISITES: MATH 2135.03 and 3040.03 or 3500.06  
 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  
 PREREQUISITES: MATH 4010.03 and 4140.03  
 CROSS-LISTING: MATH 4160.03

**\*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 3040.03 or 3500.06  
 CROSS-LISTING: MATH 4170.03

**\*MATH 5180.03/4180.03: Introduction to Algebraic Topology.**

An introduction to algebraic topology and including the following topics: homotopy type and the fundamental group, geometry of simplicial complexes, homology theory of complexes, chain complexes, homology groups for complexes, subdivision, induced homomorphisms, axioms for algebraic topology, singular homology, the singular complex, properties of cell complexes.  
 FORMAT: Lecture 3 hours  
 PREREQUISITE: MATH 4170.03  
 CROSS-LISTING: MATH 5180.03

**\*MATH 5190.03/4190.03: Differential Equations.**

MATH 3120.03 is recommended. Topics covers include existence and uniqueness theorems, continuity of solutions, Floquet theory, autonomous differential equations and their relation to dynamical systems and flows, periodic solutions and the Poincaré-Bendixson theorem.  
 FORMAT: Lecture 3 hours  
 PREREQUISITES: MATH 3500.06 (3090.03 and 3100.03) and 2030.03/2040.03 or 2135.03  
 CROSS-LISTING: MATH 5190.03

**MATH 5195.03: Topics in Topology and Functional Analysis.****MATH 5200.03/4200.03: Differential Equations - Qualitative Theory.**

CROSS-LISTING: MATH 4200.03

**MATH 5220.03/4220.03: Introduction to Partial Differential Equations.**

CROSS-LISTING: MATH 4220.03

**MATH 5230.03/4230.03: Partial Differential Equations.**

CROSS-LISTING: MATH 4230.03

**MATH 5270.03/4270.03: Numerical Software.****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 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.**

CROSS-LISTING: MATH 4300.03

**MATH 5310.03/4310.03: Nonlinear Programming.**

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.  
 INSTRUCTOR: J. Janssen

PRE-REQUISITE: 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.**

CROSS-LISTING: MATH 4330.03, CSCI 4115.03

**MATH 5400.03/4400.03: Applied Mathematics in Science and Industry.**

CROSS-LISTING: MATH 4400.03

**MATH 5410.03/4410.03: Topics in Cosmology.**

CROSS-LISTING: MATH 4410.03

**MATH 5530.03/4530.03: Differential Geometry.**

CROSS-LISTING: MATH 4530.03

**MATH 5650.03/4650.03: Relativity and Cosmology.**

CROSS-LISTING: MATH 4650.03

**MATH 5660.03/4660.03: Automata and Computability.**

CROSS-LISTING: MATH 4660.03, CSCI 4112.03

**MATH 5670.03/4670.03: Computer Algebra.**

CROSS-LISTING: MATH 4670.03

**MATH 5800.03/4800.03: Introduction to Mathematical Research.**

CROSS-LISTING: MATH 4800.03

**MATH 5900.03/4900.03: Game Theory.**

CROSS-LISTING: MATH 4900.03

**MATH 6000.03-6990.03: Reading Classes for Advanced Graduate Students.**

# Mechanical Engineering

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Location: "C1" Building  
Telephone: 902-494-3917  
Fax: 902-423-6711  
E-mail: mechanical.engineering@dal.ca

## Department Head

Kujath, M.R., McC (Warsaw Tech Univ.), PhD (Polish Academy of Sciences), PEng. Mechanisms and machinery, MEMS, robotics, space mechanics.

## Professors

Allen, P.L., BSc (MtA), BEng (TUNS), MEng (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.  
Bell, A.C., BSc (Dal), BEng (TUNS), AM, ME, ScD (MIT), PEng. Tolerances as constraints on design.  
Kalamkarov, A.L., BSc, MSc, PhD (Moscow State), DSc (Acad Sci., USSR), PEng. Stress and strength analysis, modelling, design and optimization of composite materials and smart structures.  
MacKinnon, J. History of professional engineering, information technology for teaching.  
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, Director of Canadian Residential Energy End-Use Data and Analysis Centre. 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.

## Professors Emeriti

Cochkanoff, O., BSc (UBC), MSc (Toronto), PhD (Iowa State), FCASI, FEIC, FC, SME, PEng, CD.  
Russell, L.T., BEng (TUNS), MSc (Qu), PhD (Car), PEng.

## Associate Professors

Chuang, J.M., BSc (Nat. Taiwan Ocean), MEng (Memorial), PhD (TUNS), SNAME, 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.  
Retallack, D., BEng (TUNS), MEng, PhD (UMIST), PEng. Process simulation and design, design and implementation of MIMO control systems.

## Assistant Professors

Bauer, R.J., BSc (Waterloo), PhD (Toronto), PEng. Dynamics and control.  
Warkentin, A., BEngMgt, MEng (McMaster), PhD (Waterloo), CAD/CAM

## Adjunct Professors

Hamdaullahpur, F., BSc, MSc (Tech Univ of Istanbul), PhD (TUNS), PEng.  
Hsiung, C.C., BSc (Taiwan Cheng-Kung), MSE (Mich), PhD (Calif), CEng, PEng. Naval Architecture.  
Liu, K., BEng (CSUT, China), MSc (CSUT), PhD (TUNS). Vibrations, dynamics and control of robotics, parameter identification of time-varying systems.

McTaggart, K., BSc (Queen's), MEng (Western), PhD (UBC).  
Mitchell, A.K., BEng, MAsC, PhD (TUNS), PEng.  
Oriasamolu, BSc (U of Lagos), MSc, PhD (U of Calgary), PEng.  
Tarnawski, MSc, PhD (Tech Univ of 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, MEMS, and computer aided design and manufacturing. Research and project master's degrees as well as the doctoral degree are offered.

Since Dalhousie is so closely associated with Canada's oceans, the Department of Mechanical Engineering also offers programmes in Naval Architecture, particularly at the post-graduate level. Both research and project master's degrees are available as well as the doctoral degree in Naval Architecture. A small towing tank is used for model experiments and the analytical part of the programme is supported by excellent computer facilities. See the Engineering section for Master's and Doctoral programme details.

## II. Classes Offered

NOTE: All graduate classes are not offered every year. Class offerings depend upon faculty availability and student interest.

### 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 behaviour of bubbles, the flow patterns of fluids and heat and mass transfer in a fluidized bed as a chemical reactor are studied.

### MECH 6145.03: Fluidization Phenomena II.

This class deals with the principles of fluidization 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 6230.03: Refrigeration Engineering.

This class covers basic refrigeration cycles and concepts. Major refrigeration devices such as compressors, steam ejectors, condensers, and evaporators are discussed, as well as piping and accessories. A major portion of the class is devoted to the design and selection of refrigeration equipment including computer applications in the design of refrigeration systems.

Application of refrigeration to air conditioning, the food industry, as well as the medical, petrochemical and manufacturing industries is covered. The present and future developments of heat pumps are also discussed.

PREREQUISITES: MECH 4810.03 or equivalent

### MECH 6240.03: Engineering Refrigeration II.

This class deals with the computer design and analysis of refrigeration systems. The emphasis is on food processing and refrigeration technology, design and operation of cold stores, design of land and marine transport refrigeration, and mathematical modeling of food refrigeration processes. Other subjects covered include: vapor absorption systems and cryogenic engineering and the impact of CFCs regulations on the refrigeration and air conditioning industry.

PREREQUISITES: MECH 6230.03 and MECH 5636.03

### MECH 6300.03: Finite Element Methods in Engineering Mechanics.

This class deals with the application of the Finite Element Method of stress problems encountered in engineering design. The following topics are treated: matrix algebra, element stiffness matrix for an assembly of elements, stresses in plates with in-plane loading and with lateral loading, stresses in shells and thick-walled cylinders, elastic-plastic system, dynamic systems.

### MECH 6301.03: Finite Element Method in Engineering.

This class presents formulation and implementation of Finite Element Method (FEM) in engineering applications. The theory of variational and weighted residual methods is introduced. Different types of elements used in FEM for discretization of PDE, such as linear, quadratic, iso-parametric and hybrid elements are covered. The numerical methods selected for spatial integration, solution of linear algebraic equations, evaluation of eigenvalues are addressed.

### 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.

PREREQUISITES: 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 MECH6340. 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 6380.03: Mechanical and Structural Reliability.**

This class provides the background needed for probabilistic reliability analysis, design, and integrity assessment of mechanical/structural components and systems. Fundamental concepts of applied probability theory, random variables, and stochastic processes are reviewed. Techniques for uncertainty modelling and probabilistic characterization of loads and strength are treated. Theoretical and computational probabilistic reliability analysis methodologies are extensively covered. Reliability-based design is considered. Selected advanced topics such as time-dependent reliability and stochastic finite element analysis are introduced.

PRE-REQUISITES: ENGM 4233.03 or equivalent

### **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.

PRE-REQUISITES: 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.

PRE-REQUISITES: ENGI 2200.03, MECH 4300.03

### **MECH 6520.03: Chaotic Motion.**

This class introduces the concepts of chaotic dynamics and provides the methods for identifying chaotic motions in nonlinear dynamic systems. It covers the following topics: fundamental concepts of chaos, review of analytical and numerical methods in nonlinear oscillation, chaotic motions observed in various physical systems, methods of identifying chaotic motions in experimental measurements and computer simulations, Poincare map, logistic map, bifurcation diagram, fractal dimension and Lyapunov exponent.

PRE-REQUISITES: Permission of the instructor.

### **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 6550.03: Random Vibrations.**

This class will provide students with the theoretical background to study the dynamic behaviour and responses of rigid bodies and elastic structures subjected to random inputs. Topics included in this class are Probability Theory, Stochastic Processes, Input-Output Process, Spectral Analysis of single degree and multiple degree of freedom systems, and Engineering applications. Special topics, such as fatigue estimation, ocean waves, drag force, wind force, ground motion, simulation, linearization techniques, and structural reliability, are also discussed. A term paper on a topic of individual interest is required from each student.

PRE-REQUISITES: MECH 5510.03 or equivalent

### **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 perturbations, 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 6610.03: Physical Modelling.**

The use of model analysis as a means to predict system behaviour and to obtain a better understanding of the physical basis of engineering analysis is covered.

Topics include: similitude, design of experiments, design of models and procedure for systems with undefined characteristics are introduced.

### **MECH 6620.03: Identification of Systems.**

The prime objective of this class is to demonstrate the idea of identification, which comprises building an optimal mathematical description by computer for system under test. Topics include basic concepts of identification, basic ideas of mathematical optimization, fundamentals of mathematical description of random signals, methods of linearization, examples of time and frequency domain methods of identification of discrete and distributed systems.

The laboratory portion of the class is devoted to application of an identification technique to a simple system and includes mathematical modeling, running the experiment, collecting measurement data and writing and running an identification computer programme.

### **MECH 6630.03: Space Mechanics.**

Motion in outer space poses complex engineering problems, the solution of which require a thorough knowledge and understanding of the pertinent principles of mechanics and techniques of analysis. The class provides an introduction to such topics as astromechanics, satellite orbits, rotating structures with varying configuration and mass, optimization of spacecraft motion, launch dynamics, microgravity, space robotics, large displacement low frequency vibrations, ground-based and in-orbit testing.

### **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.

PREREQUISITES: MECH 5640.03 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 programme 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.**

INSTRUCTOR: J.M. Chaung

### **MECH 6720.03: Computational Hydrodynamics II.**

INSTRUCTOR: J.M. Chaung

### **MECH 6750.03: Optical Measurement Systems.**

This class deals with the theory, design and optimization of optical measurement systems. Emphasis will be placed on industrial applications and the measurement of such mechanical quantities as strain, position, velocity, vibration and fluid flow. Topics include: light sources, light detectors, signal conditioning, noise reduction, inspection microscopes/telescopes, proximity sensors and encoders, interferometric sensors, spectroscopy, Doppler velocity measurements, analog and digital photography.

FORMAT: Lecture 3 hours, lab/tutorial 2 hours  
CROSS-LISTING: MECH 4750.03

### **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.

### **MECH6990 Directed Studies in Mechanical Engineering I.**

This class is available to graduate students enrolled in a Master's Degree Programme 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 7400.03: Optimal Control Systems.**

This class begins with the applications of the Calculus of Variations to Optimal Control. Topics include: Euler-Lagrange equations. Hamilton-Caronic equations, Pontryagin's maximum principle with application to minimum time problem, energy problem and minimum fuel problem. Singular control problems are included, along with Hamilton-Jacobi equations and dynamic programming. An introduction to optimal control of linear distributed parameter systems is given.

### **MECH 7910.03: Graduate Seminar II.**

Ph.D. students in mechanical engineering will prepare and present seminars on research topics related to their thesis project. Ph.D. 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 Ph.D. Programme 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.

## **Ocean Engineering and Naval Architecture**

### **MECH 6701.03: Dynamics of Offshore Structures.**

This class deals with methods of analysis of structures in the ocean including deterministic wave loading and the subsequent response of jacket-type structures.

The types of wave loading considered are linear waves, higher order waves and waves based upon the stream function. Matrix stiffness analysis is used in the computer analysis of structures. The static responses of structures to wave loads are determined and the deflected shapes and stress levels determined. Dynamic response using normal mode methods are carried out under the action of wave spectra and spectral fatigue analysis is presented.

### **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.

PREREQUISITES: 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 are introduced.  
PREREQUISITES: ENGM 4343.03 and MECH 6830.03

### **MECH 6865.03: Theory of Marine Hydrodynamics II.**

This is the second of two classes providing students with an advanced background of theoretical and experimental principles in Marine/Ship Hydrodynamics. This class mainly deals with boundary layer theory and potential theory for flows past floating and submerged bodies. Theory of fluid similitude is discussed. Methods of theoretical analysis resistance and lift on marine vehicles and structures are detailed. Optimal ship forms for minimum resistance are studied.  
PREREQUISITES: MECH 6845.03 or instructor's approval

### **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 6875.03: Theory of Ship Structural Analysis II.**

This class provides students with advanced theoretical methods of structural analysis for ships and ocean structures in various marine environments. It deals with hull-structure responses to environmental induced loads; hydroelastic analysis of hull flexibility, slamming and springing; isotropic and orthotropic plate theories; plastic analysis of structures; finite element methods and their applications to ships and ocean structures.  
PREREQUISITE: MECH 6870.03

### **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 will be 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 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, eigenvalue 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 9000.00: Master's Thesis/Project.**

### **MECH 9530.00: PhD Thesis.**

## **Medical Sciences**

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Location: Transplantation & Immunology  
Research Laboratory  
10th Floor Tupper Building, Room 10-D2  
Halifax, NS Canada B3H 4H7  
Telephone: (902) 494-1103  
Fax: (902) 494-5125

### **Program Co-ordinator**

Lee, T.D.G.

### **Program Assistant**

Costain, T.

## **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 programme is designed for persons who will become clinical specialists, but who plan careers as clinician scientists. The programme 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 programme offers training in clinical research, which is not otherwise formally offered at this University.

Students considering this programme 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 Accredited Residency Programme.
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 recognized 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 Programme 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 recognize that this may extend the time required to complete the programme.
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 programme is a research-intensive programme. Normally, residents applying to the Medical Sciences Graduate Programme will have made mutually acceptable arrangements with a faculty member(s) for the supervision of their research prior to applying for their programme at Dalhousie. Within three months of initiation of the programme, 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 programme 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

programme 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 programme is separate from the Royal College Clinician-Investigator Programme (CIP), but that the Director of the CIP sits on the Graduate Committee of the Medical Sciences Graduate Programme for effective communication between the two programmes. Students in the Medical Sciences Graduate Programme may also register for the CIP concurrently, but there is no requirement to do so.

### III. Programme 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. All students will also be required to take a class which includes such areas as biostatistics, experimental design, and clinical trials which is offered in co-operation with the Royal College Clinical Investigator Programme at the Faculty of Medicine. 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 programmes will be offered; but, all students will initially enroll in the MSc programme\*, which would normally be for 2 years\*\*. If, after one year of study, the student wishes to transfer to the PhD Programme, and, if his/her committee recommends such a transfer, a recommendation will be sent to the Medical Sciences Programme Committee, and from it to the Faculty of Graduate Studies for consideration and approval. The PhD programme would be expected to be completed within 3 years; a maximum of 5 years would be allowed.

\* 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 programme are left up to the discretion of the Graduate Programme Committee for Medical Sciences.

\*\* flexibility for individuals with parental responsibilities will be considered.

For more information contact the Programme Assistant.  
Telephone: (902) 494-1103; Fax: (902) 494-5125; email: Tina.Costain@dal.ca.

## Microbiology and Immunology

Location: Sir Charles Tupper Medical Building  
Seventh and Tenth Floors  
Halifax, NS B3H 4H7  
Telephone: (902) 494-3587  
Fax: (902) 494 5125

### Head of Department

Johnston, G.C.

### Professors

Anderson, R., Ph.D. (Cologne)(Viral Pathogenesis)  
Hoffman, P.S., Ph.D. (Virginia Polytech)(Microbial Pathogenesis)  
Issekutz, T.B., M.D. (Dal) Pediatrics (Inflammation and Leukocyte Traffic)  
Johnston, G.C., Ph.D. (York)(Molecular Genetics: Regulation of Proliferation)  
Lee, S.H.S., Ph.D. (Dal) (Virology; Interferon)  
Lee, T.D.G., Ph.D.(Glasgow) (Immunoregulation, Transplantation Immunology and Herbal Medicine)  
Mahony, D.E., Ph.D. (McGill)(Bacteriology; Clostridia)  
Marshall, J.S., Ph.D. (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)  
Stoltz, D.B., Ph.D. (McMaster) (Insect Virology)  
Stuttard, C., Ph.D. (Dublin) (Microbial Genetics; Streptomyces)  
Wall, J., MD (Adelaide), PhD (London). Medicine (Thyroid and Orbital Autoimmunity)

### Associate Professors

Barnes, C., PhD (Dal) (Molecular Genetics)  
Bortolussi, R.A., MD (Toronto) , FRCP(C), Pediatrics (Neonatal Infection)  
Carr, R.I., MD (Toronto), Ph.D. (Rockefeller), Medicine (Rheumatology)  
Duncan, R., Ph.D. (Guelph) (Molecular Virology)  
Hoskin, D.W., Ph.D. (McGill) (Tumour Immunology; MHC-unrestricted killer cells) Graduate Studies Coordinator  
Issekutz, A.C., MD (Dal), FRCP(C), Pediatrics (Inflammation)  
Lee, S.F., Ph.D. (Guelph) (Oral Microbiology)

### Assistant Professors

Carpenter, M.S., PhD (Manitoba) (Enterovirus Replication and Evolution)  
Faulkner, G., PhD (Dal) (Ultrastructure)  
Garduno, R.A., PhD (Victoria) (Intracellular Pathogens)  
Schlech, W.F., MD (Cornell), FRCP(C), Medicine (Listeria; HIV Infection)  
Stadnyk, A.W., Ph.D. (McMaster) (Intestinal Inflammation; Cytokines)  
West, K.A., MD (London), Medicine (Transplantation and Histocompatibility)

## I. Disciplines Within Microbiology and Immunology

Graduate degrees can be pursued in the areas of Virology, Bacteriology, Microbial Pathogenesis, Microbial Genetics, Molecular Genetics, 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 Programmes

### A. Master of Science (MSc)

For minimum time required to complete this programme, see the Faculty of Graduate Studies Regulations in this calendar. Normally, study equivalent to five credits at the graduate level is required. 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 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 programme, 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 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.

### C. Combined MD/PhD

For information on the combined MD/PhD programme see "Combined MD/PhD Programmes" in the Faculty of Graduate Studies section.

## IV. Classes Offered

### MICI 5001.06: Molecular Biology Seminars.

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 weaknesses and scientific importance of the paper presented. INSTRUCTOR: G. Johnston

### 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, auto-immunity, inflammatory diseases, immunological tolerance and infectious diseases. All students present two papers in the academic session. The students are expected to introduce the paper giving the reasons why this particular paper is of sufficient importance to be presented in this forum. The paper is put in an appropriate scientific context. The student then reviews the data presented and gives a critical analysis of the experimentation and the interpretation. The discussion assesses the extent to which the authors interpret their data in an appropriate manner and

examines the implications of this work to Immunology as a whole. This is a pass/fail class with the grading dependent on the quality of the student presentations and their contributions during discussion periods.

INSTRUCTORS: A. Stadnyk

### 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: P. Hoffman

### MICI 5027.03: Molecular Mechanisms of Cancer.

The class considers recent advances in cellular and molecular biology of cancer cells. Students participate by giving seminars on recent articles and by writing term papers on developing concepts. The following areas are discussed: properties of a cancer cell and types of tumors, mechanisms of chemical, radiation and viral induced carcinogenesis, oncogenes and protooncogenes, oncogenes and signal transduction, genetics of cancer, tumor suppressor genes, tumor susceptibility genes, multistep carcinogenesis, apoptosis in cancer, hematopoietic malignancies, diagnostic uses of oncogenes, tumor immunology and immunotherapy. INSTRUCTORS: D. Guernsey  
FORMAT: Lecture/seminar 3 hours

### 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. INSTRUCTORS: G. Johnston, 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: J. Marshall  
FORMAT: Lecture/presentation/discussion  
CROSSO-LISTING: MICI 4100.03, PATH 5100.03

### MICI 5103.03: Infectious Diseases of Aquatic Organisms.

Please refer to the Biology section for a description of this class.

### 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. This class, in combination with the virology lab module from MICI 5601.03, offers students a look at the leading edge of virus research. INSTRUCTORS: R. Duncan, D. Stoltz, R. Anderson, M. Carpenter  
FORMAT: Lecture/presentation/discussion

**MICI 5115.03: Immunology of Host Resistance.**

Students read and discuss research papers taken from the current literature in immunology. While all major areas of immunology are discussed, particular emphasis is placed on mechanisms involved in the host immune response to pathogens and tumour cells.

INSTRUCTORS: D.W. Hoskin and T. Issekutz

FORMAT: Lectures, student presentations, discussions

**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 will be taught in part from reviews and original research papers presented by students, and will emphasize the use of modern molecular biological tools in problem solving. Students are expected to earn 40% of the final grade through active participation in class.

INSTRUCTORS: R. Garduno and P. Hoffman

FORMAT: Lecture, student presentations, discussion

**MICI 5301.03: Immunobiology.**

This class is designed to examine the experimental approaches which have led and are leading to our knowledge of the biological characteristics of the immune system. We will look at the cells involved and the interactions between them, focusing on "hot topics" in antigen processing and presentation, the idiotype network, immunological tolerance and approaches to inducing it when the immune system causes disease, and the interactions between the mucosal immune system and the systemic immune system, normal and pathological autoimmunity, organ transplantation, and CNS immune system interactions. The end of the class (last two weeks) will focus on some "super hot" topics.

INSTRUCTOR: R. Carr

FORMAT: Lecture, student presentation, discussion

**MICI 5302.03: Molecular Immunology.**

This class investigates the molecules involved in the generation and expression of immune responses. Topics typically include the function of cytokines, the generation of antibody diversity by immunoglobulin gene rearrangement, the structure and function of cell surface receptors such as the T cell antigen receptor, MHC and adhesion molecules, and the molecular interactions which lead to immune non-responsiveness.

INSTRUCTORS: T. Lee and A. Stadnyk

FORMAT: Lecture, student presentations, discussion

**MICI 5601.03: Laboratory Techniques in Molecular Biology I.**

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 and 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. 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 programme. 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 24 hours prior to the organization meeting, the date of which will be indicated in the Registration Timetable.

INSTRUCTORS: Biochemistry, Biology, Microbiology and Immunology faculty members

COORDINATOR: H.-S. Ro

FORMAT: Laboratory approximately 72 hours total

**MICI 5602.03: Laboratory Techniques in Molecular Biology II.**

This class consists of a series of laboratory modules covering techniques used in molecular biology and immunology. Three modules will be offered, each of four weeks duration, six hours per week. The class is intended primarily for honours and graduate students. Students should consult with the class coordinator regarding eligibility and availability of space.

INSTRUCTORS: L.E. Murray and members of the Department of Microbiology & Immunology

FORMAT: Lab 6 hours

**MICI 9000.00: MSc Thesis.****MICI 9530.00: PhD Thesis.**

# Mining and Metallurgical Engineering

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Location: "G" and "P" Buildings  
Telephone: 902-494-3954  
Fax: 902-425-1037  
E-mail: minmet@dal.ca

## Department Head (Interim)

Yemenidjian, N.B., BEng, PhD (Concordia). Electronic materials, ceramics & glasses.

## Professors

Caley, W.F., BSc (Eng), MSc (Eng) (Queen's), PhD (Toronto), PEng. Ceramic and metal matrix composites, pyrometallurgy, slag/refractory reactions in steelmaking.

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.

Lee, G. M. C., BSc, PhD (London). MIMechE, MIM, PEng Graduate Coordinator, Metallurgical Engineering. Fracture mechanics, fatigue crack growth, cavitation erosion.

Rockwell, M.C., BEng (Petro), MEng, PhD (TUNS), PEng., Chairman, Mining Engineering Program. Petroleum engineering, reservoir engineering, mine waste management, mine production engineering, ocean mining.

Yemenidjian, N.B., BEng, PhD (Concordia). Electronic materials, ceramics & glasses.

## Associate Professors

Hill, J.D., BSc, MSc (Acadia), PhD (UWO). Mining geology, time domain reflectometry.

Zou, D.H., BSc (Xuzhou), PhD (UBC), PEng, Graduate Coordinator, Mining. Rock mechanics, mine planning and design, numerical modelling, microseismic monitoring, industrial waste treatment.

## Assistant Professors

Butt, S.D., BEng, PEng, MSc (Memorial), PhD (Queens). Mining technology, microseismic monitoring, rock bursts, computer aided mine planning.

Gharghoury, M.A., BAsC (Toronto), PhD (McMaster), PEng. Deformation of HCP metals, metal matrix composites, fatigue failure, electron microscopy, finite element analysis.

## Professor Emeritus

Hancock, H.A., BAsC, MAsC, PhD (Toronto), PEng. Corrosion of superalloys, slag additions to cement, chemical desulphurization of coal.

## Adjunct Professors

Adorjan, L.A., BSc, PhD (Birmingham), PEng, CEng. Mineral processing, coal separation, solid-liquid separation.

Chaturvedi, M.C., BSc (Banaras), MMet, PhD (Sheffield). Aerospace materials, joining of materials, intermetallic materials.

Jones, D.S., BEng (TUNS), MBA (Western Ontario), PhD (TUNS), PEng. Rock mechanics, ground control, mine design, ventilation.

Kanary, L.E., BEng, MAsC, PhD (TUNS), PEng. Polymeric materials, pultrusion, composite materials.

Laufer, E.E., BSc, MSc (Dal), PhD (Virginia). Physical metallurgy, electron microscopy.

Whiteway, S.G., BSc, DiplChemEng, MSc (Dal.), PhD (McGill), F.C.I.C. Chemistry of metallurgical reactions.

## Adjunct Assistant Professor

Kasemets, J.T., BEng (Royal Military College), MEng (Alberta), MBA (Ottawa). Blasting, explosives, rock breaking.

## I. Programme

See the Engineering section of this calendar for Master's and Doctoral programme details.

## II. Classes Offered

### METL Series: Metallurgical Engineering

#### METL 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.

#### METL 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.

#### METL 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.

#### METL 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.

#### METL 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.

#### METL 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.

#### METL 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.

**\*METL 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.

**\*METL 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.

**\*METL 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.

**METL 6022.03: Directed Studies in Metallurgical Engineering.**

This class is available to graduate students enrolled in a Masters programme 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 programme.

**METL 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.

PREREQUISITES: METL 0700.03 or METL 0820.03 or equivalent

**METL 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.

**METL 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

**METL 7022.03: Directed Studies in Metallurgical Engineering.**

This class is available to graduate students enrolled in a Ph.D. Programme 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 Ph.D. Programme.

**METL 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

**METL 9000.00: Master's Thesis/Project.**

**METL 9530.00: PhD Thesis.**

**Metallurgy Seminar**

Weekly seminars are held, with speakers both from within the department and from outside. All students are encouraged to attend, and all candidates for graduate degrees including combined BENG./MASC. Co-op students from Term 6 on are required to participate in the seminars by attending for at least three terms, and by presenting at least one seminar during this period.

**MINE Series: Mining 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.

PREREQUISITES: Knowledge of differential equations and linear algebra and MINE 1011.03 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 6003.03: Environmental Geology.**

This class deals with the relationship between man and his geological habitat. Emphasis is placed on earth processes, earth resources and engineering properties of rocks and surficial deposits insofar as these are important to or in some way affect human activities. Special reference will be made to man and the Earth, composition and structure of the Earth's crust, the significance of land forms, earth processes; engineering properties of soils and rocks; earth resources; man as a geological agent. Conservation and management and the application of environment geologic data to the traditional field of engineering and economic geology.

**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 Programme 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 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.

**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.

#### **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.

PREREQUISITES: MINE 1314.03

#### **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 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: Mining Graduate Seminar I.**

All Master's students are required to participate in the seminar every year. Students will prepare and make presentations on topics related to their research projects. This will normally be one presentation per year. Evaluation will be based on preparation, presentation skills, ability to field questions and regular attendance. Graded pass/fail.

#### **MINE 7007.03: Directed Studies in Mining Engineering.**

This class is available to Graduate Students enrolled in a Ph.D. Programme 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: Mining Graduate Seminar II.**

All Ph.D. students are required to participate in the seminar every year. Students will prepare and make presentations on topics related to their research projects. This will normally be one presentation per year. Evaluation will be based on preparation, presentation skills, ability to field questions and regular attendance. Graded pass/fail.

#### **MINE 9000.00: Master's Thesis/Project.**

#### **MINE 9530.00: PhD Thesis.**

# Neuroscience

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Contact: Dr. K. Semba  
Department of Anatomy and Neurobiology  
Telephone: (902) 494-2008  
Fax: (902) 494-1212  
or Graduate Coordinator of individual  
Departments

## Faculty Advisors

### Department of Anatomy & Neurobiology

Allen, G.V., PhD (Dal)  
Baldrige, W.H., PhD (McMaster)  
Clarke, D., MD, PhD (McGill)  
Currie, R.W., PhD (Man)  
Darvesh, S., MD, PhD (UNB) (primary appointment in Neurology)  
Hagg, T., MD (Leiden), PhD (UCSD)  
Hopkins, D.A., PhD (McMaster)  
Mendez, I.M., MD, PhD (UWO) (primary appointment in Neurosurgery).  
Neumann, P.E., MD (Brown)  
Rutherford, J.G., PhD (SUNY)  
Semba, K., PhD (Rutgers)  
Smith, F.M., PhD (UBC)  
Wassersug, R.W., PhD (Chicago)

### Department of Biochemistry

Byers, D.M., PhD (Alta)  
Cook, H.W., PhD (Dal)

### Department of Pharmacology

Denovan-Wright, E., PhD (Dal)  
Downie, J., PhD (Man.)  
Dursun, S., MD (Turkey), PhD (primary appointment in Psychiatry).  
Hall, R.I., MD (Dal) (primary appointment in Anaesthesiology).  
Howlett, S.E., PhD (Memorial)  
Hung, O., MD (Dal) (primary appointment in Anaesthesiology)  
Kelly, M., PhD (Southampton)  
Robertson, H.A., PhD (Cantab)  
Sawynok, J., PhD (Queen's)  
White, T., PhD (Bristol)

### Department of Physiology & Biophysics

Barnes, S., PhD (Berkeley)  
Chauhan, B.C., PhD (Wales) (primary appointment in Ophthalmology).  
Croll, R.P., PhD (McGill)  
Fine, A.V., MD, PhD (Penn)  
French, A.S., PhD (Essex)  
Guernsey, D.L., PhD (Hawaii) (primary appointment in Pathology).  
Murphy, M.G., PhD (Dalhousie)  
Pelzer, D. J., MD (Heidelberg)  
Rasmusson, D.D., PhD (Dalhousie)  
Torkkeli, P., PhD (Alberta)  
Villarroel, A., PhD (UCLA)  
Wilkinson, M., PhD (London) (joint appointment in Obstetrics/Gynecology)

### Department of Psychology

Adamo, S.A., PhD (McGill)  
Brown, R.E., PhD (Dalhousie)  
Connolly, J.F., PhD (London)  
Eskes, G.A., PhD (Berkeley) (primary appointment in Psychiatry).  
Fentress, J.C., PhD (Cantab.)  
Kalynchuk, L., PhD (UBC)  
Klein, R.M., PhD (Oregon)

Kopala, L., MD (Calgary) (primary appointment in Psychiatry).  
Kutcher, S.P., MD (McMaster) (primary appointment in Psychiatry).  
McGrath, P.J., PhD (Queen's)  
Meinertzhagen, I.A., PhD (St. Andrews)  
Mitchell, D.E., PhD (Berkeley)  
Phillips, D.P., PhD (Monash)  
Rusak, B., PhD (Berkeley) (joint appointment in Psychiatry)  
Shaw, S.R., PhD (St. Andrews)  
Taylor-Helmick, T., PhD (Dal)  
Yoon, M.G., PhD (Berkeley)

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) and the Department of Electrical and Computer Engineering are involved in neuroscience research.

The University offers a graduate programme leading to the Master of Science and/or Doctor of Philosophy degree. This interdisciplinary programme is coordinated with the departments of Anatomy and Neurobiology, Biochemistry, 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 programme. The student must be accepted first by the Departmental Graduate Programme Committee and then by the Neuroscience Programme Committee.

The programme 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 Programme Committee and the Neuroscience Programme Committee; the Supervisory Committee is primarily responsible for designing and approving the programme that will best meet the student's needs.

## I. Admission Requirements

Students apply to the Neuroscience Programme 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 Programme. Students must indicate the department with which they plan to affiliate, e.g. Neuroscience (Psychology). In addition, students who are already in the graduate programme 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 degree wishing to do a PhD are usually registered initially in the MSc programme, but may be considered for transfer into the PhD programme 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. Classes Offered

### 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 5062.03: Autonomic Regulation: Central Mechanisms.

Please see class description for ANAT 5062.03 in the Anatomy and Neurobiology section of this calendar.

### NESC 5063.03: Neurobiology of the Peripheral Autonomic Nervous System.

Please see class description for ANAT 5063.03 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 6100X/Y.06: Principles in 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 behavioural neurobiology and will cover topics such as visual and somatosensory systems, motor programme generation, autonomic and neuroendocrine functions, motivation, learning, circadian rhythmicity and sleep/wake cycles, and cognitive neuroscience. Evaluation will be based on several oral and written presentations prepared throughout the year.

NOTE: Students taking this class must register in both X and Y in consecutive terms; credit will only be given if both are complete consecutively.

INSTRUCTOR: S. Barnes, D. Rasmusson, K. Semba

**NESC 6101.03: Principles in Neuroscience: Cellular and Molecular Neuroscience.****NESC 6102.03: Principles in Neuroscience: Systems and behavioural Neuroscience.****ANAT 5090.03: Cellular Development in the Nervous System.****ANAT 5100.06: Neuroanatomy.****ANAT 5609.03: Anatomical and Molecular Neuropharmacology of the Basal Ganglia: the Scientific Basis for Grafting and Neural Transplantation.**

Please see class description for ANAT 5609.03 in the Anatomy and Neurobiology section of this calendar.

CROSS-LISTING: PHAC 5609.03

**BIOC 5300.03: Biochemical Communication: Membranes and Cell Signalling.****PHAC 5405.03: Advanced Pharmacology.****PHAC 5608.03: Psychopharmacology.****PHAC 5615.03: Transmembrane Signal Transduction in Vertebrate Cells.****PHAC 5616.03: Molecular Pharmacology.****PHYL 5459.03: Cellular Biophysics.****PHYL 5518.03: Ligand-gated Ion Channels.****PHYL 5520.03: Cellular Biophysics.****PHYL 5521.03: Molecular Physiology.****PSYO 6051.03: Neural Basis of Perception.****PSYO 6160.03: Comparative Psychology.****PSYO 6218.03: Topics in Psychopharmacology.****PSYO 6270.03: Comparative Neurobiology.****PSYO 6300.06: Cognitive Neuropsychology.****PSYO 6313.03: Topics in Cognitive Psychology.****PSYO 6800.03: Clinical Neuropsychology.**

# Nursing

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Location: Forrest Building, First Floor  
5869 University Avenue  
Halifax, NS B3H 3J5  
Telephone: (902) 494-2535  
Fax: (902) 494-3487  
Website: <http://is.dal.ca/~son/>

## Director

Downe-Wamboldt, B.L., DipPH, BN, MEd(Dal), PhD (Texas-Austin), RN. Chronically ill elderly people and their families, coping, health promotion and primary health-care, elder abuse, death and dying, health care policy analysis, meaning of illness.

## Associate Directors

Meagher-Stewart, D., BScN (MSVU), MHSc (McMaster), PhD (candidate) (Toronto), RN. (Community health, women's health, cardiovascular health, nurses' worklife issues, health promotion and rehabilitation perspectives.)  
Smillie, C.L., BScN (UBC), MSc(Ed) (Dal), EdD (Toronto), RN. Programme planning evaluation, health education, volunteer development, cancer related prevention.  
Wittstock, L., BScN (StFX), MN (Dal), RN. School health.

## Coordinator, Nurse Practitioner Programme

Martin-Misener, R., DOCHN, BScN, MN (Dal), RN

## Coordinator, BScN (Arctic Nursing)

Martin-Misener, R., DOCHN, BScN, MN (Dal), RN

## Professors

Downe-Wamboldt, B.L., DipPH, BN, MEd (Dal), PhD (Texas-Austin), RN  
Keddy, B., BScN (MSVU), MA, PhD (Dal). Women and aging, women's health, qualitative and feminist methodologies, cross-cultural health, health care reform

## Associate Professors

Butler, L., BScN (MSVU), MN (Dal), PhD (Toronto), RN. Quantitative methods, oncology quality of living, meaning of illness, recurrences, sexual health.  
Ellerton, M.L., BScN (Ottawa), MN (McGill), RN. Nursing of children and families, breast health, coping with childhood illness, preparation for children's hospitalization.  
Gregor, F., BN, MN, PhD (Dal), RN. Social organization of nurses' work, women's health care work, gender and caregiving.  
Hart, G., BN (McGill), MSN (UBC), RN. Qualitative assessments, interventions for persons/families with chronic illness.  
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.  
Meagher-Stewart, D., BScN (MSVU), MHSc (McMaster), PhD (candidate) (Toronto), RN  
Melanson, P., BScN (Ottawa), MN (Dal), RN. Gerontological nursing, chronic illness, coping, elder abuse.  
Smillie, C.L., BScN (UBC), MSc(Ed) (Dal), EdD (Toronto), RN  
Sommerfeld, D., BScN (MSVU), MSN (UBC), RN. Maternal and infant health, parent/caregiver interaction, mothering.  
Tomblin-Murphy, G., BN, MN (Dal), PhD (candidate) (Toronto), RN. Collaboration and social support, job satisfaction, and coping in Canadian nurses in HIV/AIDS care, health human resource planning and worklife issues for nurses.

Wong, J., BScN (MSVU), MScN (Western), PhD (Dal), RN. Physiology of aging in the cardiovascular system, patient compliance.

Wong, S., BScN (MSVU), MScN (Western), PhD (Dal), RN. Physiological-based nursing, patient compliance, quantitative methods, analysis of qualitative data using content analysis.

## Assistant Professor

Murphy, N., BN (Dal), MScN (UBC). Mental health/psychiatric nursing, citizen participation in health policy making.

## I. Admission Requirements

All applicants must be licensed to practice as registered nurses (active practitioner) in a province in Canada or in a foreign country. Applicants must have a Bachelor's degree with a minimum "B" standing. Basic preparation including work experience for the clinical specialization study is required, as are introductory classes in research and statistics. Three letters of reference are also required.

## II. Degree Programmes

### A. Master of Nursing (MN)

Dalhousie University School of Nursing offers a two-year research-oriented programme preparing graduates to demonstrate leadership in nursing. The programme consists of 8 credits. Following completion of core classes which include advanced preparation in clinical nursing, students choose among three streams:

- A thesis is intended for those students seeking to conduct independent and/or collaborative research,
- A health policy practicum is intended for those students seeking to increase knowledge and skills in health care policy development, implementation or evaluation, or
- An advanced nurse practitioner option is intended for those students seeking preparation as an advanced nursing practitioner.

Prospective applicants are encouraged to consult the School of Nursing to identify specific clinical offerings in any academic year. Elective class(es) may be chosen, in consultation with the academic advisor, from a variety of fields.

The MN programme is accepted by MPHEC as a regional programme for the Maritime Provinces. Non-nursing electives may be taken at other universities (prior approval must be obtained from the School of Nursing). Graduate nursing classes within the programme are also offered by distance education modes to other Maritime regional centres.

### B. Master of Nursing with Master of Health Services Administration (Combined MN/MHSA)

The combined MN/MHSA programme is a three-year programme which enables students to select classes leading to degrees of Master of Nursing and Master of Health Services Administration. The MN/MHSA programme 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 programmes is maintained by the design of the three-year MN/MHSA programme; however, the number of credits required is reduced by electing to take this joint programme.

Candidates for the MN/MHSA programme must satisfy the entrance requirements of both programmes, and may obtain further information about the combined programme 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.

### III. Immunization

Before undertaking clinical practica (NURS54X2, NURS54X4, NURS5620, NURS5740), 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. Evidence of tuberculin testing (Mantoux) is also required. Immunization against Hepatitis B is recommended.

### IV. Classes Offered

#### **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: Research Methods I.**

This qualitative research class differentiates 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. An emphasis will be placed on the examination of various philosophical and ideological assumptions which guide all research, that is, the methodology. Positivism and all that is implied by the concept will be examined. The question "Is research gender, race, sexual orientation and class biased?" will be addressed throughout the class in order to best understand what is meant by *methodology*. In addition, various *methods* which are qualitative in nature will be explored in detail.

#### **NURS 5120.03: Research Methods II.**

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.

#### **NURS 5200.03: Health Care Reform and Its Impact on Nursing.**

This class examines the continuing evolution of the Canadian health care system. The development of health care policy is analyzed and critiqued within a broad social, economic, and cultural framework. The impact of the implementation of specific health care policies on consumers will be analyzed from a conceptual and practical perspective. The identification and development of skills and strategies required by nurses and nursing to influence change in the health care system are discussed.

#### **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.

#### **NURS 5330.03: Theoretical Concepts & Competencies Related to the Helping Relationship in Advanced Nursing Practice.**

This class will examine theoretical concepts related to the nature of functions of helping relationships that involve nurses engaged in advanced practice and consumers (individuals, family, group). In addition, it will explore the reciprocal effects of issues, such as complex health phenomena and changing health care systems, on this relationship. Finally, it will provide opportunity for students to practice advanced roles and competencies with consumers (either actual or simulated), in keeping with the theoretical concepts discussed throughout the class.

#### **Advanced Clinical Theory I Classes**

These classes are the study of the theories and research related to selected health-related concepts and issues relevant to advanced practice across the specific clinical specialty area.

#### **NURS 5431.03: Adult Nursing: Clinical Theory I.**

#### **NURS 5441.03: Community Nursing: Clinical Theory I.**

#### **NURS 5451.03: Mental Health Nursing: Clinical Theory I.**

#### **NURS 5461.03: Maternal Child Nursing: Clinical Theory I.**

#### **NURS 5471.03: Nursing Families with III Children: Clinical Theory I.**

#### **Advanced Clinical Practicum I Classes**

These classes will focus on the assessment and understanding of patterns of health and illness occurring within a selected client population. Students will engage in clinical practica with the population of interest, and will apply relevant theories, paradigms, and concepts in understanding and developing a plan of care with the client population.

#### **NURS 5432.03: Adult Nursing: Clinical Practicum I.** CO/PRE-REQUISITE: NURS 5431.03

#### **NURS 5442.03: Community Nursing: Clinical Practicum I.** CO/PRE-REQUISITE: NURS 5441.03

#### **NURS 5452.03: Mental Health Nursing: Clinical Practicum I.** CO/PRE-REQUISITE: NURS 5451.03

#### **NURS 5462.03: Maternal Child Nursing: Clinical Practicum I.** CO/PRE-REQUISITE: NURS 5461.03

#### **NURS 5472.03: Nursing Families with III Children: Clinical Practicum I.** CO/PRE-REQUISITE: NURS 5471.03

#### **Advanced Clinical Theory II Classes**

These classes focus on the examination of research and theoretical knowledge for nursing interventions for various phenomena as a basis for advanced practice across the specific clinical specialty areas. Students will examine how the evidence provides the foundation for clinical judgements and actions designed for specific outcomes with their population of interest.

#### **NURS 5433.03: Adult Nursing: Clinical Theory II.** PREREQUISITE: NURS 5431.03

#### **NURS 5443.03: Community Nursing: Clinical Theory II.** PREREQUISITE: NURS 5441.03

**NURS 5453.03: Mental Health Nursing: Clinical Theory II.**

PREREQUISITE: NURS 5451.03

**NURS 5463.03: Maternal Child Nursing: Clinical Theory II.**

PREREQUISITE: NURS 5461.03

**NURS 5473.03: Nursing Families with Ill Children: Clinical Theory II.**

PREREQUISITE: NURS 5471.03

**Advanced Clinical Practicum II Classes**

These classes require students to incorporate the implementation of advanced approaches to nursing phenomena on individual, family and aggregate bases. This will include an examination of issues from the perspective of individual, family, and community, as well as from organizational and societal perspectives. Students will develop their own definition of an advanced nursing role within the organizational context of their professional practice.

**NURS 5434.03: Adult Nursing: Clinical Practicum II.**

PREREQUISITE: NURS 5431.03 and 5432.03

CO/PRE-REQUISITE: NURS 5433.03

**NURS 5444.03: Community Nursing: Clinical Practicum II.**

PREREQUISITE: NURS 5441.03, 5442.03

CO/PRE-REQUISITE: NURS 5443.03

**NURS 5454.03: Mental Health Psychiatric Nursing: Clinical Practicum II.**

PREREQUISITE: NURS 5451.03, 5452.03

CO/PRE-REQUISITE: NURS 5453.03

**NURS 5464.03: Maternal Child Nursing: Clinical Practicum II.**

PREREQUISITE: NURS 5461.03, 5462.03

CO/PRE-REQUISITE: NURS 5463.03

**NURS 5474.03: Nursing Families with Ill Children: Clinical Practicum II.**

PREREQUISITE: NURS 5471.03, 5472.03

CO/PRE-REQUISITE: NURS 5473.03

**NURS 5610.03: Advanced Practitioner Role Development.**

The focus of this class is on the role of advanced practice nurse in health care (e.g., clinical nurse specialist, nurse practitioner). Emphasis will be on the examination and critique of the role of components of the clinical nurse specialist, i.e., direct care, consultation, education, research, leadership/administration. Issues surrounding the implementation of these roles within a primary health care context in clinical specialties will be discussed. PREREQUISITE: NURS 54X1.03

**NURS 5620.06: Advanced Practice Role Practicum.**

This graduate class provides the student with the opportunity to integrate, synthesize and analyze previously developed knowledge and skills in an intensive clinical practice experience (700 hrs) directly related to the student's chosen client population/discipline in an advanced nursing practice role. 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.

PREREQUISITE: NURS 54X4.03

**NURS 5732.03 Pharmacology for Advanced Nursing Practice.**

This is a seminar class which aims to provide the students with an in-depth examination of human physiological functions in disease, and allow them to gain experience reading and criticizing scientific papers in the area of their choice. The content has been carefully selected to address the most relevant diseases in the Atlantic Provinces as well as in Canada. The major diseases to be covered include cardiovascular and cerebrovascular diseases, cancer, diabetes mellitus, and chronic obstructive pulmonary diseases. The format is largely discussion, both of the objectives from each disease and of scientific papers. Each student will be asked to present several papers during the term.

**NURS 5735.03 Pathophysiology for Advanced Nursing Practice.**

This graduate class is designed to build and expand upon the student's pharmacotherapeutic knowledge and skills as they relate to advanced nursing practice. The focus of the class will be on clinical applications related to common drug and non-drug therapies relevant to specialty nurse practitioners. In addition, legal and ethical responsibilities related to pharmacotherapeutic interventions are addressed. Students will be given the opportunity to integrate pharmacokinetic and pharmacodynamic concepts for a chosen client population/discipline in the clinical setting. Students will gain therapeutic knowledge that includes the actions, usual dosages, absorption, distributions, and side effects of commonly prescribed medications which are encountered by specialty nurse practitioners in a tertiary care setting. Additionally, students will learn to identify and utilize timely and appropriate drug information resources in their daily practice.

**NURS 5740.03: Advanced Health Assessment.**

This graduate class prepares graduate 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 a comprehensive health assessment including history taking, physical examination, synthesis, critical analysis, and interpretation of health data, diagnostic reasoning and clinical judgement. Students will acquire an understanding of the pathophysiological basis of clinical findings and will integrate an increased knowledge of pathophysiology and pharmacology as a basis for formulating a plan of care. Practical elements of advanced health assessment include physical and mental health, psychosocial, family, cultural and community factors and the implications of 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 and the associated techniques prior to beginning the class.

**NURS 5800X/Y.06/5810.03/5820.03: Reading Course.**

NOTE: Students taking NURS 5800X/Y.06 must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

**NURS 5830.03: Death and Dying/Palliative Care (Palliative Care: Theory and Practice).**

This class will provide a general overview of the significant issues facing individuals and their families related to life threatening illness and dying. Research findings, theories of pain and symptom management, grief and loss, communication, and coping and their significance for palliative care nursing will be explored. The impact of health care reform on services for clients with life threatening illness (LTI) and the role of the nurse within an interdisciplinary palliative care team will be a focus.

CROSS-LISTING: NURS 4340.03

### **NURS 5840.03: Human Resources in Health Care.**

See description for HESA 6340.03 in the Health Services Administration section of this calendar.

### **NURS 5841.03: Management Union Relations in Health Care.**

See description for HESA 6341.03 in the Health Services Administration section of this calendar.

### **NURS 5850.03: Women and Aging.**

As women grow older the experience of aging is generally more difficult for them than for men. Somewhere in the forties, anxieties about the aging process exacerbate the difficulties facing women in modern society. Disempowering older women is usually accomplished in small increments. "Old woman" is a pejorative label; the older a woman becomes, the less credibility she generally has; this is especially true for women of color, poor women, lesbians, and women who are physically challenged. While aging is a biological phenomenon, ageism is socially constructed. Specifically, under patriarchy, older women are seen as a burden, desexualized and segregated by both men and younger women. They are usually not taken very seriously, nor seen as a threat. This class will explore the issues related to social, psychological, political and economic factors that are major determinants to the well-being of aging women based upon race, gender, sexual orientation, disabilities and class inequities.

CROSS-LISTING: NURS 4370.03, SOSA 3245.03, SOSA 5245.03, WOST 3810.03

### **NURS 5865.03 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. This class covers quantitative methods and tools for QM/ helping address the need for change management, interpersonal and presentation skills; and integrating issues of social responsibility (to the extent that managers can affect the relationship between the quality and cost of health services).

### **NURS 5891.03: Health Informatics.**

This class will provide an overview of Information Technology and Systems as it relates to practice, research, administration, and education for health professionals. Students will be introduced to information technology and provided with opportunities to use critical thinking in analyzing the implication of information systems. This class will be taught using interactive distance technology. Students will be required to contribute to class discussion through a Web-based bulletin board. Students will have the option to attend audio-teleconferencing every two weeks.

CROSS-LISTING: NURS 3310.03

### **NURS 5900.06/5910.03/5920.03: Reading Course.**

NOTE: Students taking NURS 5900 must register in both X and Y in consecutive terms; credit will be given only if both are completed consecutively.

### **NURS 5950.03: Self-directed Learning in Nursing.**

This elective provides an opportunity for students to carry out an independent study or project related to health care, with assistance from the faculty facilitator and resource persons. Students will systematically identify, plan, execute and evaluate a learning project relevant to nursing practice, administration or education.

CROSS-LISTING: NURS 4330.03

### **NURS 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.

CROSS-LISTING: NURS 4800.03, HEED 2250.03, PHYT 3090.03, PHAR 4850.03

### **NURS 6000.03: Nursing Administration and Leadership (Leadership and Administration in Health Care).**

This class focuses on the changing role and expectations for health care managers 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 class activities including extensive readings, case studies, student presentations, field assignments and papers.

CROSS-LISTING: HESA 6000.03

### **NURS 7000X/Y.06: Health Policy Practicum.**

A 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 the 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 9000.00 Thesis.**

#### **\*Nursing Electives**

NURS 5840.03: Human Resources in Health Care.

NURS 5841.03: Management Union Relations in Health Care.

NURS 5850.03: Women and Aging.

NURS 5865.03: Quality Management (cross-listed with HESA 6365.03).

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 5891.03: Health Informatics.

NURS 5898.03: Health Promotion/Primary Health Care and Professional Practice.

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/MHSA 6000.03: Nursing Administration and Leadership.

\*Not offered every year

A minimum registration of three students is normally required for any class to be offered.

# Occupational Therapy

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Location: (Atlantic) School of Occupational Therapy  
Forrest Building, Dalhousie University  
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## Director

Townsend, E., DipP & OT, BSc (OT) (Toronto) MAdEd (St. FX),  
PhD (Dal)

## Graduate Coordinator

Townsend, E., DipP & OT (Toronto), BSc (OT) (Toronto) MAdEd  
(St. FX), PhD (Dal)

## Professor Emeritus

O'Shea, B., DipP & OT (Toronto), BSc (Queens), MS (Colorado  
State) Occupation as a determinant of health; curriculum  
design for professional studies; cross-cultural transfer of  
knowledge.

## Professor

Townsend, E., DipP & OT (Toronto), 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.

## Associate Professors

Doble, S., BSc (OT) (Western), MS (Boston), PhD (Dal)  
Measurement related to occupational function; care giving of  
seniors; occupational analysis of seniors.  
Unruh, A., BSc (OT) (Western), MSW (Carleton), PhD (Dal)  
Appraisal, gender pain, and occupation; pain education for  
occupational therapists; spirituality and gardening.

## Assistant Professors

Banks, S., BSc (Dal), MA (Dalhousie) Educational outcomes;  
integration of academic and theoretical learning.  
Beagan, B., BA, MA (Soc) (Dal), PhD (Soc) (UBC). Sociology of  
health and illness, health profession education, social  
inequality, research methodology.  
MacNeill, M., BSc (OT) (Dal), MS (Illinois) LLB/MBA (candidate)  
(Dal) Design, implementation and evaluation of new and  
innovative service delivery methods.  
Pranger, T., BSc (OT) (Toronto), MEd (Toronto), PhD (Toronto)  
Consumer empowerment, health systems, programme  
evaluation, embedding theory in practice.  
Stadnyk, R., BA (Alberta), BSc OT (Queens), MSc (Queens), PhD  
Candidate (Toronto) Community practice; everyday lives of  
frail elderly persons and services to support them.  
Taylor, S., DipOT (Queens), MA (SMU) Fieldwork education;  
sociocultural factors in international transfer of knowledge;  
environment for the teaching- learning process.

## Adjunct Professors

### Academic

Blain, J., BSc (Napier), MA (Dal), PhD (Dal)  
Do Rozario, L., BOT (Queensland), DTS (Brisbane), MTP  
(California), PhD (Queensland)  
Egan, M., BSc(OT) (Western), MSc(OT) (Alberta), PhD (McGill)  
Law, M., BSc(OT) (Queens), MHS (McMaster), PhD (Waterloo)

Mitcham, M., DipOT (Northampton), BSc(OT), MHE, PhD (Georgia)  
Palmadottir, G., DipOT (Aarhus, Denmark), MSc(OT) (Colorado)  
Whiteford, G., BSc(OT) (Curtin), MHS(OT), PhD (South Australia)

### Professional

Cutcliffe, H., Dip(OT) (Man)  
Head, B., BSc(OT) (Alberta)  
Rousel, M., DipHS (S-L Maillet), BSc, MA (Montréal)  
Spindler, M., DipP & OT (Toronto)

### Cross Appointment

Wright, A., BA (Mount Allison), GTC, MA (McGill), PhD (Montréal)

### Iceland Project Coordinators

Palmadottir, G., DipOT (Aarhus, Denmark), MSc(OT) (Colorado)  
Townsend, E., DipP & OT, BSc (OT) (Toronto) MAdEd (St. FX), PhD  
(Dal)

## I. Introduction

The School of Occupational Therapy opened a Master of Science (Occupational Therapy) programme in 1998. Serving Atlantic Canada and beyond, this is an innovative, part time or full time, distance education, five-credit Master's programme with course work (non-thesis) or thesis options. A practicum component completed in a student's chosen location affords students the opportunity to explore and develop theory on enabling occupation through practice. Focused on occupation and occupational therapy, students deepen their knowledge in one or more areas of concentration defined as Foundations, Evaluation, and Systems Organization. Examples include: **Foundations:** Nature, processes and organization of occupation drawn from disciplines such as anthropology, economics, education, history, medicine, philosophy, physiology, psychology, and sociology. **Evaluation:** Qualitative or quantitative evaluation of occupation or occupational therapy with respect to individuals, populations, programs, or systems. Measurement issues, instrument development, ethnographic, narrative and other methods in evaluation. **Systems Organization:** Organization of occupation in society, organization and management of occupational therapy services, examining public and/or private systems, policy development, systems change and reform, funding, health, law, etc.

## II. Admission Requirements

Admission may be: a) to the MSc (Occupational Therapy) programme, full or part time *by distance*; b) to an individualized graduate Qualifying Programme, full or part time, to prepare for graduate studies; c) to specified class(es) (maximum 2 classes), as a Special Graduate Student *by distance*. Distance classes use e-mail as the primary form of communication, and the Internet as a central educational medium. Admission to OCCU 5020, Graduate Seminar and Practicum, may require eligibility for licensure as an occupational therapist if practice is regulated in a student's chosen practicum location. Students should note the technology requirements for each class. Numbers admitted will depend on school resources.

### A. Master of Science (Occupational Therapy)

Admission to the degree programme is open to occupational therapists with a Bachelor degree with honours or strong evidence of experience or advanced study in theory and research. Priority will be given to occupational therapists who demonstrate the most favourable combination of academic excellence, leadership experience, referee recommendation, and a knowledge of current trends in occupational therapy. Course work (non-thesis) or thesis options are available.

### B. Qualifying Programme

Occupational therapists with a diploma, or who are without honours standing or research, theory or other classes which are now typical in an undergraduate occupational therapy programme may apply to complete a Qualifying Programme prior to applying for admission to the MSc (OT) programme. A Qualifying Programme may be full or part time, 0.5 to 5.0 credits. Those who need to complete a Qualifying Programme should apply with a request for an assessment of their readiness for graduate studies. An applicant's individually-designed Qualifying Programme will be finalized by both the applicant and the

Graduate Programme Admissions Committee as part of the admissions process. Those who satisfactorily complete a Qualifying Programme with an average of B+ or better in all Qualifying classes become eligible to apply for admission to the MSc (OT) programme. Completion of the Qualifying Programme does not automatically guarantee admission to the MSc (OT) programme. Qualifying Programme students are governed by regulations in the Faculty of Graduate Studies. Occupational Therapy classes will be completed on the Dalhousie campus, or by individualized Directed Study by distance study.

### C. Special Student - Graduate Studies (SSGS) (No-Degree, For Class Specific Admission)

Admission to a maximum of four classes is open to occupational therapists who meet Faculty of Graduate Studies criteria, with permission of class instructors and the School graduate coordinator. Transfer credits for two classes taken by special Graduate Students may be applied if students are later admitted to the MSc (OT) programme, with approval of the Graduate Programme Admissions Committee.

### D. Advanced Placement (Transfer Credits)

Occupational therapists with partial or completed graduate level education in another field or at another university are invited to apply. A maximum of one full credit (two classes) with a grade of A - or above may be accepted, on individual review of transcripts and full class descriptions.

### E. Dalhousie Letters of Permission

Students may complete up to 1.0 full credit (two elective classes) of the MSc (OT) programme outside Dalhousie under Letters of Permission from the School Admissions Committee.

Documentation can be submitted with an application or after the student has been admitted. Inquiries prior to admission are normally not answerable since review is done in the context of an applicant's study plans. A grade of B- or higher is required for these classes to be given credit for the MSc (OT). Enrollment at Dalhousie enables students to complete classes by Letter of Permission at Canadian Maritime universities without additional fees, whereas additional fees will be required by other universities.

### F. Awards, Scholarships, Bursaries

School and Dalhousie University awards are listed in the Awards section of this calendar.

## III. Application

### A. Documentation

All application materials are available on-line at [www.registrar.dal.ca/](http://www.registrar.dal.ca/). All applicants must submit:

- Faculty of Graduate Studies Application Form;
- If applicable, proof of English language competency;
- Application fee;
- Distance fees;
- Letter of Intent;
- Curriculum Vitae;
- Statement on Diversity;
- Two letters of Academic Reference (if possible);
- Two copies of official transcripts of all university classes;
- Prior Learning and Distance Questionnaire;
- If applicable, request for specified classes of interest.

### B. Deadlines

#### Canadian and Non-Canadian Applicants

MSc (OT) and Qualifying Programme Applications June 1 (Acceptance begins after February 1)

Special Student - Graduate Studies (SSGS) Applications (for September)

August 15  
(for January)  
(for May)

November 15  
April 15

## IV. Programme Requirements

### A. Description

Students registered in the course work (non-thesis) or thesis programme will complete a minimum of five full credits.

Subject Area	Thesis Option Credits	Coursework Option Credits
Core Theory	0.5	0.5
Seminar and Practicum	1.0	1.0
Practice Leadership	-	0.5
Occupational Therapy Classes 1. Evidence-based practice 2. Programme evaluation 3. Community development	(Classes may be taken as electives.)	(students select two classes)  2 x 0.5
Research	0.5 (OCCU 5030.03 recommended)	0.5 (OCCU 5030.03 recommended)
Electives	1.0 (2 x 0.5 at or outside Dalhousie) (0.5 for additional research if needed)	1.5 (3 x 0.5, maximum of 1.0 outside Dalhousie)
Thesis	2.0	-

### B. Residency, Orientation, Additional Classes, Advisors (Degree students, not single course students)

A two week residency period at the end of August is expected at the start of the first year of a student's programme of study for both full-time and part-time students. The schedule includes orientation to the program, library and technology, seminars and reading to start: OCCU 5020.06: Graduate Seminar and Practicum.

Flexibility is offered for completing required classes. Negotiations between a student and 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. Additional classes at Dalhousie are being developed for distance study.

Students wishing to spend more time on campus are welcome to make their own arrangements to use library and other university and School facilities. Each student is assigned a Faculty Advisor who may nor may not become the Thesis Supervisor.

### C. Full-Time and Part-Time Study

The MSc (OT) programme is available to students on a full time or part time basis. 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. 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 and OCCU 5020.06: Graduate Seminar and Practicum.

### D. 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: texts, 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 2 week orientation. Depending on a student's thesis research, statistical or qualitative analysis software and bibliographic software are recommended.

### E. Programme Inquiries or Registrar

Programme application and information at:  
<http://www.registrar.dal.ca>, or (902) 494-2450 (phone) or (902) 494-1630 (Fax).

Further information at: [www.occtherapy.dal.ca](http://www.occtherapy.dal.ca) or (902) 494-6351 (phone) or (902) 494-1229 (Fax), or e-mail at [occupational.therapy@dal.ca](mailto:occupational.therapy@dal.ca)

## V. Class Descriptions

### **OCCU 5010.03: Advanced Studies on Enabling Occupation.**

This class involves 13 weeks of web-based learning and e-mail discussion. The 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 MSc (OT) programme: Foundations, Evaluation, and Systems Organization. The class is open to both students in the MSc(OT) programme and to occupational therapists who register as Special Students - Graduate Studies (SSGS) on permission of the first instructor. (September - December)

INSTRUCTOR: R. Stadyk and E. Townsend

FORMAT: WebCT, e-mail

TECHNOLOGY: Netscape or Microsoft Internet Explorer 4.5 minimum; Windows 95 (sound recommended), Modem 28.8 Kb minimum Internet connection

### **OCCU 5020X/Y.06: Graduate Seminar and Practicum.**

This 26-week seminar and practicum class provides students with the opportunity to explore and embed theory in enabling occupation in practice. The goals of the class are to explore a particular theoretical area, develop new skills and roles, become competent in reflective practice. The class has two components: The seminars occur at strategic points throughout the class. The initial seminars take place during the two week on-campus residency/orientation and are aimed at orienting students to key concepts and issues relevant to the practicum part of the class. In subsequent seminars, students present and discuss key issues and learning they have gathered from the practicum. Interprofessional and interdisciplinary participation in the seminars are encouraged. The practicum experience entails students working in a site of their choice for normally 180 hours of designated practicum time, separate from normal work duties and typically spread over 8 weeks in the fall term and 12 weeks in the winter term. The practicum is to focus on organizational, systems and societal level issues and allows the students to explore roles in management, consulting, programme planning and evaluation, policy development and implementation. Individual practicum requirements will be negotiated in a signed learning contract by the students and class instructor.

INSTRUCTOR: T. Pranger

FORMAT: Seminars, practicum, e-mail, discussion, teleconference, and web-based learning

TECHNOLOGY & SOFTWARE: Netscape or Microsoft Internet Explorer 4.5 minimum; Modem 28.8 Kb minimum, Windows 95, e-mail

### **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 in the social sciences, distinguishing between realist and constructionist approaches. It then focuses on the development and application of theoretical approaches to research within the three areas of Foundations, Evaluation, and Systems Organization, which form the basis of Dalhousie's MSc (OT) programme. Goals of the class are to develop facility in designing and pursuing research projects, within the three areas of concentration, 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. While ethnographic/narrative methods will be emphasized, students are encouraged in this class to develop a facility with quantitative methods and statistics packages that will benefit their thesis research or interests in evidence-based practice. The class is open both to students in the MSc (OT)

programme and to occupational therapists who register as Special Students - Graduate Studies (SSGS) on permission of the instructor. (January - April)

INSTRUCTOR: B. Beagan

FORMAT: WebCT, e-mail

TECHNOLOGY & SOFTWARE: Netscape or Microsoft Internet Explorer 4.5 minimum, modem 28.8Kb minimum, internet connection, statistics program such as SPSS or SAS. Other software may be required at the discretion of the instructor.

### **OCCU 5040.03: Identity and Transitions.**

**Not available in 2001.**

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 6-week 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. This class is offered from March-April.

FORMAT: WebCT, e-mail

TECHNOLOGY & SOFTWARE: Windows 95, Netscape or Microsoft Internet Explorer 4.5 minimum, Internet connection, modem 28.8Kb minimum, e-mail

### **OCCU 5041.03: Evidence-Based Occupational Therapy.**

This 7-week class will provide students with the opportunity to examine and critique evidence-based practice and its application to occupational therapy. Using readings, online exercises, and discussion, students will analyze the principles underlying evidence-based practice, learn methods to critically appraise the literature, and integrate these methods into occupational therapy practice. The class is open both to students in the MSc (OT) programme and to occupational therapists who register as Special Students - Graduate Studies (SSGS) on permission of the instructor. (January - April)

INSTRUCTOR: M. Law

FORMAT: WebCT, e-mail

TECHNOLOGY & SOFTWARE: Windows 95, Netscape or Microsoft Internet Explorer 4.5 minimum, Internet connection, modem 28.8Kb minimum, e-mail

### **OCCU 5042.03: Community Development for Occupational Therapists.**

This 13-week 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. This class is open both to students in the MSc(OT) and to occupational therapists who register as Special Students - Graduate Studies (SSGS) on permission of the instructor. (September - December)

INSTRUCTOR: L. do Rozario

FORMAT: WebCT, e-mail

TECHNOLOGY & SOFTWARE: Netscape or Microsoft Internet Explorer 4.5 minimum, modem with 28.8kb minimum, internet connection, e-mail

### **OCCU 5501.03/5502.03/5503.03/5504.04: Graduate Reading.**

In a reading class, the student is assigned to 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 will submit a discussion schedule and planned assignments and grading criteria for approval by the School's Graduate Programme 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 9000.00: Thesis.**

The thesis will require 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 e-mail, telephone, post, teleconference or other communication as appropriate.

# Oceanography

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Location: Life Sciences Centre  
1355 Oxford Street  
Halifax, NS B3H 4J1  
Telephone: (902) 494-3557  
Fax: (902) 494-3877  
E-mail: Oceanography@Dal.ca  
Website: <http://www.dal.ca/oceanography>

## Chair of Department

Moore, R.M.

## Graduate Studies Co-ordinator

Hill, P.

## Professors

Beaumont, C., BSc (Sussex), PhD (Dal), INCO Fellow of the CIAR. Geodynamics  
Bowen, A.J., MA (Cantab), PhD (Scripps), FRSC. Physical oceanography, nearshore dynamics, sediment transport.  
Chylek, P., Diploma (Physics) (Charles, Prague), PhD (Calif), joint appointment in Physics. Radiative physics; radiative transfer in theory, in the laboratory, and in the atmosphere.  
Cullen, J., AB (Calif, Santa Cruz), PhD (Scripps) (NSERC/Satlantic Research Chair) Phytoplankton processes, optical measurements, effects of ultraviolet radiation  
Doyle, R.W., MSc (Dal), PhD (Yale), cross appointment with Biology  
Fournier, R.O., MSc (Wm. & Mary), PhD (URI). Biological oceanography  
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) (NSERC/Satlantic Research Chair). Physical oceanography, ocean acoustics  
Lewis, M.R., BS, MS (Maryland), PhD (Dal). Biological oceanography, marine ecosystem modelling  
Louden, K.E., BA (Oberlin), MEd. (Temple), PhD (MIT). Marine geophysics  
Mills, E.L., BSc (Carl.), MS, PhD (Yale), FLS. Benthic ecology, history of oceanography  
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 Computer Science. Physical oceanography/climatology

## Associate Professors

Boudreau, B.P., BSc (UNB), MS (Texas A&M), PhD (Yale). Diagenesis, sediment-water interactions, geochemical modelling (Leave of Absence 2000-2001)  
Folkins, I., BSc (Dal), MSc, PhD (Toronto), joint appointment with Physics. Stratospheric ozone modelling, atmospheric chemistry.  
Hill, P.S., AB (Dartmouth), MSc, PhD (Wash). Fine sediment transport, particle aggregation.  
Kelley, D., BSc (MtA), PhD (Dal). Ocean mixing, deep convection, double diffusion, arctic mixing  
Miller, W., BA (Wake Forest), MSc (S. Florida), PhD (URI). Trace element cycles, aquatic photochemistry, chemical-biological interactions

Taggart, C.T., BSc (Carleton), MSc (York), PhD (McGill). Fisheries oceanography and early life history phenomena, biological-physical interactions, population genetics

## Assistant Professors

Lohmann, U., PhD (Hamburg), jointly with Physics. Cloud physics, climate modelling, aerosol-cloud-radiation interactions  
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

## Adjunct Professors

Barker, Howard, BSc (Toronto), MSc, PhD (McMaster), ARMP, AES  
Boyd, C.M., MA (Ind), PhD (Scripps). Zooplankton distribution, behaviour, and sensory physiology.  
Bricelj, M., Licenciatura, Univ. Of Buenos Aires, MS, PhD, MSRV, SUNY, Stony Brook, NRC. Physiological ecology, bioenergetics, aquaculture of bivalve molluscs  
Cembella, A., BSc (Simon Fraser), PhD (UBC), NRC. Population dynamics, genetics and ecophysiology of toxic marine algae and transfer of biotoxins in marine food webs  
Craigie, J.S., BA, MA, PhD (Queen's), NRC. Algal physiology, algal membrane structure, storage products  
Frank, K.T., BSc, PhD (Toledo), Dept. of Fisheries & Ocean, BIO. Population dynamics, stock assessment, fisheries oceanography recruitment  
Hargrave, B.T., BSc, MSc (Dal), PhD (UBC), BIO, Fisheries & Oceans. Benthic ecology  
Isaac, G., BSc, MSc, PhD (McGill), Atmospheric Environment Service. Atmospheric chemistry, tropospheric aerosols, cloud measurements from aircraft  
King, M., BA (Colorado College), MS, PhD (Arizona), NASA, Goddard Space Flight Center. Atmospheric radiation, remote sensing, cloud physics  
Li, Z., BSc, MSc (Nanjing), PhD (McGill), CCRS  
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  
Wright, D.G., BSc (Laurentian), PhD (UBC), Atlantic Oceanographic Laboratory, BIO. Climate dynamics, coastal oceanography, geophysical fluid dynamics.

## Research Associates

Dobson, F., BSc, MSc (Dal), PhD (UBC), Atlantic Oceanographic Laboratory, Environment Canada  
Gershey, R., BSc (Scranton), MSc (Texas), PhD (Dal), BDR Research Ltd.  
Harrison, W.G., BSc, PhD (NC State Univ), BIO, Ocean Sciences Division  
Head, E. BA (Cambridge), MPhil (London), PhD (Wales), Dept. of Fisheries and Oceans, BIO  
Loder, J., BSc (Acadia), PhD (Dal), Dept. of Fisheries and Oceans, BIO  
Sinclair, M., BSc (Hons) (Qu), MSc (Southampton), PhD (Scripps), Fisheries and Oceans

## 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 Programmes

### A. Master of Science (MSc)

For minimum time required to complete this programme, 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 programme, see the Faculty of Graduate Studies regulations in this calendar. In addition to completion of four introductory half-classes (5110.03-5140.03), students must take at least two additional advanced classes, ordinarily in the area of the candidate's special interest. Candidates must write a comprehensive exam. Consult the Oceanography Graduate Handbook for details.

Candidates must write and defend a proposal for thesis research.

Research and a thesis are required.

## III. Classes Offered

Classes marked \* are not offered every year. Please consult timetable upon registration.

### OCEA 5110.03: Introduction to 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 1 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 honours undergraduates only will be admitted by consent of the instructor.

INSTRUCTORS: P. Hill, K. Louden  
CROSS-LISTING: OCEA 4110.03

### OCEA 5120.03: Introduction to 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. The class also includes a brief introduction to practical aspects of instruments and methodology, via a field trip and a laboratory session. 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. Those desiring a more qualitative approach are urged to consider OCEA 3170.

INSTRUCTOR: D. Kelley  
CROSS-LISTING: OCEA 4120.03

### OCEA 5130.03: Introduction to 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: R.M. Moore

CROSS-LISTING: OCEA 4130.03

### OCEA 5140.03: Introduction to Biological Oceanography.

A class for graduate students in which the relationship between the plants and animals of the sea and their chemical and physical environment is explored. The class is concentrated on the research literature, so that students can examine the major unsolved problems of the discipline, as well as gain background knowledge for research in oceanography.

INSTRUCTOR: A. Metaxas

CROSS-LISTING: OCEA 4140.03

### 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: C. Taggart

CROSS-LISTINGS: BIOL 4369.03, OCEA 4160.03

### \*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: K. Thompson

CROSS-LISTING: OCEA 4210.03

### 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: 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: R. Greatbatch

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: A.J. Bowen/J. Sheng

**\*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: T. Bowen/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: M. Lewis  
CROSS-LISTING: OCEA 4230.03

**OCEA 5250.03: Introduction to 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: A. Hay  
CROSS-LISTING: OCEA 4250.03

**\*OCEA 5270.03: Special Topics in Biological Oceanography.**

**OCEA 5285.03: Marine Geochemical Processes.**

This class combines thermodynamic and kinetic approaches to the description of processes which control chemical distributions in the ocean. Basic chemical equations are presented and evaluated for their ability to explain and predict oceanic observations. Topics include metal chemistry, reactive transient reactions, dissolved organic carbon, and gas exchange. Assignments will require simple computer modelling skills and draw from current literature.  
INSTRUCTOR: W. Miller

**\*OCEA 5290.03: Advanced Chemical Oceanography.**

**\*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 neighbouring institutions.

**\*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: 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: D. Kelley  
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: 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: E.L. Mills  
CROSS-LISTING: BIOL 4664.03, HIST 3073.03, HSTC 3331.03, OCEA 4331.03, SCIE 4001.03

**\*OCEA 5350.03: Marine Geophysics.**

This class is designed to give the student an in-depth perspective in the areas of marine gravity, magnetics, and seismics. The mathematical basis for each of these data types is presented, but the prime emphasis is placed on interpretation of what an anomaly or a reflector may mean and how significant it is. This class is taught from a tectonics perspective. A good grounding in calculus is necessary. Previous experience in computer programming is very useful.  
INSTRUCTOR: K.E. Loudon  
CROSS-LISTING: EARTH 4280.03, OCEA 4350.03

**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: 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: M. Lewis  
CROSS-LISTING: OCEA 4380.03

### **OCEA 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.

INSTRUCTOR: B. Ruddick

CROSS-LISTING: OCEA 4411.03, PHYC 4411.03/5441.03

### **OCEA 5412.03: Atmospheric Dynamics II.**

The approach is the same as for 4411.03/5411.03, with emphasis placed on synoptic-scale wave phenomena, frontal motions, and the global circulation. An introduction to numerical techniques and their use in weather forecasting models and studies of climate is included. Additional special topics are covered at the discretion of the instructor.

CROSS-LISTING: OCEA 4412.03, PHYC 4412.03/5412.03

### **\*OCEA 5500.03: Atmospheric Physics I.**

Main topics covered in this class are atmospheric thermodynamics and atmospheric radiation.

CROSS-LISTING: OCEA 4500.03, PHYC 4500.03/5500.03

### **\*OCEA 5510.03: Atmospheric Physics II.**

The major topic covered is cloud physics. Other topics include atmospheric optics and acoustics, lightning and radar techniques.

INSTRUCTOR: U. Lohmann

CROSS-LISTING: OCEA 4510.03, PHYC 4510.03/5510.03

### **OCEA 5520.03: Introduction to Atmospheric Science.**

This is a self-contained class that provides an introduction to the main ideas and concepts in meteorology. The emphasis will be on developing an understanding of how the atmosphere works and to begin to "read" and appreciate the ever-changing sky and weather. Mathematics will be used occasionally (some first year calculus and algebra). Class participation will be encouraged by using a discussion and seminar format in the afternoon classes. The class is open to all students of all interests and disciplines.

INSTRUCTOR: U. Lohmann

CROSS-LISTING: OCEA 4520.03, PHYC 4520.03/5520.03

### **\*OCEA 5541.03: Synoptic Meteorology I.**

This class introduces principles and techniques of meteorological analysis, diagnosis of weather systems and prognosis of system motion and development. A brief review is presented of meteorological instrumentation, observational procedures, codes and analysis techniques essential to the study of the main subject matter. Atmospheric systems and processes are carried out during the tutorial-laboratory period.

CROSS-LISTINGS: OCEA 4541.03, PHYC 4540.03/5540.03

### **\*OCEA 5550.03: Synoptic Meteorology II.**

This class extends the analysis and diagnosis of atmospheric dynamics and weather processes introduced in OCEA 4541.03/5541.03. Modern statistical and computer methods and satellite techniques are discussed. Case studies of atmospheric systems and processes are carried out during the tutorial-laboratory period.

CROSS-LISTINGS: OCEA 4550.03, PHYC 4550.03/5550.03

### **OCEA 5570.03: Light Scattering and Radiative Transfer.**

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.

INSTRUCTORS: P. Chylek

CROSS-LISTING: PHYC 6570.03

### **\*OCEA 5575.03: Topics in Atmospheric Radiation.**

This advanced graduate class will focus on current hot research topics in atmospheric radiation. By doing research projects the fundamental theory of light scattering and radiative transfer will

be applied to the selected topics. In each research project, the students will be required read papers, participate in class discussions, do computer work, write project report, and give presentation. The form of the class will be a combination of lecturing and team learning. It is expected that students learn to do research best when they are actively involved in the process.

CROSS-LISTING: PHYC 6575.03

### **\*OCEA 5580.03: Cloud Physics.**

A detailed examination of the behaviour of condensed water in the atmosphere. Microphysical 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.

INSTRUCTOR: U. Lohman

CROSS-LISTING: PHYC 6580.03

### **\*OCEA 5590.03: Paleoclimatology.**

Climate models, quaternary climates, dating systems, paleoclimatic indicators, historical climate fluctuations, prequaternary climates, environmental consequences of an asteroid impact, synthesis of past climates, paleoclimatic perspectives on the greenhouse problem.

INSTRUCTOR: P. Chylek

### **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: I. Folkins

CROSS-LISTING: OCEA 4595.03

### **OCEA 5600.03: Invertebrate Fisheries and Aquaculture.**

Subject matter will deal with commercially exploited invertebrates (crustaceans and molluscs) with a heavy emphasis on bivalves.

Topics to be covered include: (1) Review of the major invertebrate harvest fisheries (locations, methods, population cycles, fisheries models). (2) Biology and ecology of the Bivalvia (feeding, bioenergetics, growth, and reproduction). (3) Shellfish aquaculture (methods, species, site location, economics). These topics will be covered with respect to the Maritimes as well as non-local fisheries. Class structure will be a mixture of lecture and class discussions, supplemented by visits to aquaculture sites. Class requirements will include a research paper and oral presentations.

INSTRUCTORS: J. Grant, G. Newkirk

CROSS-LISTINGS: BIOL 4600.03/5600.03, OCEA 4600.03

### **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: C. Beaumont/R.A. Jamieson

CROSS-LISTING: EARTH 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.

# Oral and Maxillofacial Surgery

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Location: 5981 University Avenue  
Halifax, NS B3H 3J5  
Telephone: (902) 494-1679

## Chair

Precious, D.S., DDS, MSc, FRCD(C), FICD, FADI, FACD,  
Programme Director of Graduate Training Programme.  
Dento-facial deformities, cleft palate and/or lip

## Honourary Professor

Natsume, N., DDS, MD, PhD

## Professors

Cohen, M.M., Jr., AB (Mich), DMD (Tufts), MSD (Minn), MPH  
(Boston), PhD (Minn), FCCMG, Head, Division of Oral and  
Maxillofacial Pathology. Syndromology, genetics, pediatrics  
Coonan, T.J., MD, FRCP(C). Neuroanesthesia  
Holness, R., BSc, FRCS(C), DABNS  
Janigan, D., BSc, MD, CM  
Lovely, F.W., DDS (Dal), MS (Mich), FRCD(C) FICD, FACD  
Marrie, T., MD, FRCP(C), FACP  
Precious, D.S., DDS, MSc (Dal), FRCD(C), FICD, FADI, FACD,  
Chair; Programme Director of Graduate Training Programme.  
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  
Forward, K., MD, FRCP(C)  
Goosday, R.H.B., DDS, MSc (Dal), FRCD(C), Head, Division of  
Oral and Maxillofacial Surgery. Orthognathic surgery  
Hamilton, K., MBBS, FRCP  
Howes, W., MD, FRCS(C)  
Leahey, L., MD, FRCS(C)  
Lovas, J.G.L., BSc, DDS (Toronto), MSc (Western), FRCD(C). Oral  
and maxillofacial pathology  
Mann, E., BSc, MD, FRCP(C)

## Assistant Professors

Davis, Ben, DDS, FRCDC  
Drysdale, A.A., MDCM, FRCP(C), (Emeritus)  
Goulding, J., BSc, MD, MCFP(EM), FACEP  
Hung, O., MD, Cert. in Anaesthesia, FRCP(C)  
Michael, R., BSc, MD, FRCP(C), FCCP  
Morrison, A.D., DDS, MSc, FRCD(C). Trauma and orthognathic  
surgery  
Pass, B., MSc, PhD, DDS, Head, Division of Oral and Maxillofacial  
Radiology. Trace element analysis  
Wright, B.A., BDS (London), LDS, RCS (Eng), DDS (Dal), MS  
(Indiana), MD (Dal), FRCP(C), FACS. Medical, legal and  
independent medical insurance examination  
Yabsley, R.H., MD, BSc (Med), FRCS(C), FACS. Medical, legal and  
independent medical insurance examination

The six-year programme in Oral and Maxillofacial Surgery 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 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 programme and pay full tuition for the first five years and thesis only registration for the sixth year.

Application must be completed prior to June 30 of the year preceding commencement of the programme.

## II. MD/MSc Degree Programme 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 programme

In addition to the requirements for successful completion of the MD degree, the following classes are required to complete the MSc component of the programme.

## III. Classes Offered

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 programme. Students study the cause, pathogenesis, clinical, radiographic and microscopic characteristics of diseases affecting the oral and panraora 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 Year 1, 2, 3 and 4 of the MSc component of the programme. This seminar, with all the Oral 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 and 2) have monthly case reviews.  
CROSS-LISTING: ORAL 6040.06, 7010.06, 8010.06

### ORAL 5080.06: Clinical Oral and Maxillofacial Surgery.

Is presented during Year 1, 2, 3 and 4 of the MSc component of the programme. A major portion of the Graduate Student's time will be spent in the provision of Oral 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.

**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.

**ORAL 6030.06: Oral and Maxillofacial Pathology.**

CROSS-LISTING: ORAL 5060.06.

**ORAL 6040.06: Oral and Maxillofacial Surgery Seminar (Audit).**

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.

**ORAL 6070.06: Infectious Diseases. (Audit)**

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.

**ORAL 6080.06: Emergency Medicine. (Audit)**

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.

**ORAL 6090.06: Neurosurgery. (Audit)**

This is a one month rotation.

**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 his findings in a thesis, acceptable to the Senior Staff, Programme Director and Faculty of Graduate Studies. All or animal studies pertaining to research requirements shall be completed prior to January 1 of this 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 (Obstetrics and Gynecology, Pediatrics and Psychiatry clerkships only)

Please refer to the Four Year Programme in the undergraduate calendar for Medicine.

# Pathology

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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

Moss, M.A.

## Graduate Coordinator

Greer, W.L.

## Professors

Casson, A., MB, ChB. (Manchester), FRCSC, FCCP, FACS. Thoracic surgery.  
Fraser, A.D., BA (Houghton), PhD (Boston), FCACB, DABCC. Clinical toxicology; Therapeutic drug monitoring.  
Guernsey, D.L., BA (Lehigh), MS (Bridgeport), PhD (Hawaii). Molecular oncology; genetic basis of human disease; molecular neurobiology.  
Greer, W.L., BSc, PhD (Western), FCCMG - Graduate Studies Coordinator. Human molecular genetics; molecular diagnosis of cancer.  
Issekutz, A., MD (Dal) FRCP (C) (major appointment in Microbiology and Immunology). Pediatrics (inflammation).  
Issekutz, T., MD (Dal), FRCP (C). Pediatric immunology, inflammation.  
Lee, T., PhD (Glasgow) (major appointment in Microbiology & Immunology). Immunoregulation, transplantation immunology and herbal medicine.  
Marshall, J.S., BSc, PhD (Manchester). The role and regulation of mast cells in immune responses to bacteria, viruses and tumours, regulation of cytokines in inflammatory bowel diseases and asthma.  
Moss, M.A., MB, BS (London), MSc (Dal), FRCP(C). Environmental pathology.  
Nassar, B.A., BSc (Beirut), PhD (Newcastle), MB, BCh (Cairo), FRCP(C). Essential fatty acids and prostaglandins; molecular diagnosis of hyperlipidemias; familial cancers; porphyrias.  
Rowden, G., BSc (Exeter), MSc, PhD (London), DSc (London), FRCP (UK), MRC Path. Dermatopathology with emphasis on the immune system of the skin.  
Wright, Jr., J.R., BS, MA, MD, PhD (Ohio State). Experimental diabetes; islet transplantation; perinatal pathology.

## Associate Professors

Dooley, K.C., PhD (UBC). Computerization and instrumental methods; diagnostic enzymology; screening for metabolic disease.  
Fraser, R.B., MSc, MD (Dal), FRCP(C), FCAP, PP  
Guha, A.K., BSc, MD, MSc, PhD (Dal), FRCP(C). Autoimmune disease testing & use of monoclonal antibodies for cancer detection and therapy.  
Gupta, R., MB, BS (India), FRCP(C). Kidney transplantation - chronic rejection; uropathology.  
Lee, S.H.S., PhD (Dal). (major appointment in Microbiology & Immunology) Virology, interferon.  
Neumann, P.E., MD, BA (Brown), (major appointment in Anatomy and Neurobiology). Developmental neurogenetics.  
Riddell, D.C., BSc, PhD (Queen's). Tumour suppressors; human molecular genetics.  
West, K., MD (Western). Dendritic cells and their interaction with T cells and the immune response; transplantation.  
Zayed, E.Z.M.A., MB, BCh (Egypt) FRCP(C). Coagulation and platelet disorders.

## Assistant Professors

Dymond, L.C., BSc (Memorial), MSc, MD (Dal), FRCP(C). Interference in digoxin assays; hypouricemic states.  
Hirsch, G., MD (Mt. Sinai). (major appointment in Department of Surgery) Surgery.  
McAlister, V., BCH, DCH, MB (Dublin), FRSC(I), FRCS(C), (major appointment in Department of Surgery).  
Resch, L., MD (Dal), FRCP. Computerized image analysis.

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 programme is intended to give the student a strong background in the experimental approach in pathology. Although the programme may be completed in 12 months, most students require 24 months.

The research work and thesis defence are valued at 2½ credits. All students are required to attend and participate in the research seminar programme (PATH 5091.03) for a credit value of ½. In addition, 2 other credits are required, in a subject related to the thesis or in the laboratory field chosen. Other classes may be required depending upon the background preparation of the student, the nature of their thesis, or the student's career goals.

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 programme 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 programme 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 programme.

### C. MD/PhD in Pathology

Applications to this programme could be considered once the candidate has been accepted into medical school.

## III. Classes Offered

### PATH 5000.03: General Pathology.

A reading/discussion class covering basic systems and processes in pathology.  
INSTRUCTOR: J. Wright

### PATH 5001.03: Advanced Mechanisms of Pathology.

This class will provide an in-depth study of such topics as cell injury, adaptation and repair, inflammation, fluid and hemodynamic derangements, free radical damage, environmental pathology and aging.  
INSTRUCTOR: M. Bullock

### **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: L.C. Dymond

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: L.C. Dymond

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.

INSTRUCTORS: D. Guernsey

CROSS-LISTING: MICI 5027.03/4027.03

NOTE: Not offered in 2000/2001.

### **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.

INSTRUCTORS: 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 behaviour of tumours will be highlighted. The clinical aspects of cancer management will also be presented.

### **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: 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: 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 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: G. Rowden

### **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.

INSTRUCTOR: W.L. 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 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: J. Marshall

CROSS-LISTING: MICI 4100.03, 5100.03

### **PATH 9000.00: MSc Thesis.**

### **PATH 9530.00: PhD Thesis.**

## **IV. Seminars - Conferences**

A series of weekly seminars, journal clubs, and conferences is conducted throughout the year in various areas of pathology, and laboratory medicine.

## **V. Areas of Specialization for MSc or PhD Degree**

- Thoracic surgery: A. Casson
- Computerization and instrumental methods; diagnostic enzymology; screening for metabolic disease: K.C. Dooley
- Interference in digoxin assays; hypouricemic states: L.C. Dymond
- Clinical toxicology; therapeutic drug monitoring: A.D. Fraser
- 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
- Chronic rejection; allograft arteriosclerosis; vascular biology; cell adhesion molecules and T cell infiltration; cytolytic cell role in transplantation: G. Hirsch
- Pediatrics (Inflammation): A. Issekutz
- Pediatric Immunology, Inflammation: T. Issekutz
- Virology, interferon: S.H.S. Lee
- Immunoregulation, transplantation immunology and herbal medicine: T. Lee
- Role and regulation of mast cells in immune responses to bacteria, viruses and tumours. Regulation of cytokines in inflammatory bowel diseases and asthma: J.S. Marshall
- Clinical transplantation; recipient's immune conditioning and chronic rejection: V. McAlister
- Environmental pathology: M.A. Moss
- Essential fatty acids and prostaglandins; molecular diagnosis of hyperlipidemias; familial cancers; porphyrias: B. Nassar
- Developmental neurogenetics: P.E. Neumann
- Dendritic cells and their interaction with T cells and the immune response; transplantation: K. West
- Computerized image analysis: L. Resch
- Tumour suppressors; human molecular genetics: D.C. Riddell
- Dermatopathology with emphasis on the immune system of the skin: G. Rowden
- Experimental diabetes; islet transplantation; perinatal pathology: J. Wright
- Coagulation and platelet disorders: E.Z.M.A. Zayed

## Pharmacology

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Location: Sir Charles Tupper Medical Building, Sixth Floor  
5859 University Avenue  
Halifax, NS B3H 4H7

Telephone: (902) 494-3435  
Fax: (902) 494-1388  
E-mail: tom.white@dal.ca

### Head of Department

Robertson, H.A.

### Graduate Coordinator

White, T.D.

### Professors

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

Ferrier, G.R., BSc, PhD (Man). Cardiac physiology and pharmacology, excitation-contraction coupling, transmembrane ion currents, cardiac arrhythmias and antiarrhythmic drugs, ischemia, heart failure, adrenergic drugs

Gray, J.D., BSc, MD, (Alta), FRCP(C), Medicine

Howlett, S.E., BSc (Concordia), MSc, PhD (Memorial). Cardiovascular pharmacology and electrophysiology, cardiac excitation-contraction coupling, heart disease

Renton, K.W., BSc (Sir Geo Wms), PhD (McGill). Drug metabolism, cytochrome P-450, drug interaction, CNS inflammation

Robertson, H.A., BA, MSc, (Western), PhD (Cantab). Immediate early genes, dopamine, kindling, parkinsonism, molecular neurobiology

Sawynok, J., BSc, MSc (Melb), PhD (Queen's). Adenosine, ATP, nociception, spinal cord, inflammation, caffeine

White, T.D., BSc, MSc (Western), PhD (Bristol) Graduate Studies Coordinator. Purines, ATP, adenosine, neuromodulator, neurotransmission, CNS, excitotoxicity, neuroprotection, neuroinflammation

### Associate Professors

Blay, J., BSc (Brad), PhD (Cantab). Cancer, immunotherapy, antieoplastic drugs, growth regulation, cytotoxicity assays

Kelly, M.E.M., BSc, PhD (Southampton). Ion channels, membrane transport, autonomic neurons, ocular epithelial cells, cholinergic agonists, catecholamines, patch-clamping, cell culture, immunocytochemistry

McKenzie, G.M., BSc (Windsor), MSc, PhD (Dal)

### Assistant 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 $\beta$ , molecular endocrinology

### Cross Appointments

Anderson, G., BVSc (Melbourne), MSc (Guelph), PhD (Toronto). Major Appointment in Department of Surgery

Drobitch, R., BSc (Windsor), PhD (Wayne State), Major Appointment in College of Pharmacy

Dursun, S., MD (Hacettepe, Turkey), PhD (Aston, UK). Major Appointment in Department of Psychiatry

Hall, R.I., BSc Pharm, MD (Dal), FRCP(C), FCC, Major Appointment in Department of Anesthesia

Hung, O.R., BSc Pharm, MD (Dal) FRCP(C), Major Appointment in Department of Anesthesia

Kopala, L.C., BSc (Alta), MD (Calgary), Major Appointment in Department of Psychiatry  
Peterson, T.C., BSc (SMU), MSc, PhD (Dal), Major Appointment in Department of Medicine  
Rusak, B., BA (Toronto), PhD (Berkeley), Major Appointments in Departments of Psychology and Psychiatry

### Adjunct Professors

Cribb, A., DVM (Saskatchewan), PhD (Toronto), Major Appointment in Department of Anatomy / Physiology at UPEI  
Winther, M., BSc (California at Santa Barbara), PhD (Stirling), Major Appointment with Quanta Nova Canada Ltd.

## 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 programme in Pharmacology.

## II. Degree Programmes

The following are the MINIMUM requirements for our graduate programmes. Equivalencies may be granted for classes taken before entering our programme. As indicated below, equivalency may also be granted for classes taken during the programmes.

### A. MSc Pharmacology

Candidates must satisfactorily complete the following classes or their equivalents: 5406.03, 5407.03 or 5408.03, 5506.03, and a minimum of one (1) 5600 half-credit class and another 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 programme. This may be taken during the course of the graduate programme. 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: 5406.03, 5407.03 or 5408.03, 5506.03, 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 programme. This may be taken during the class of the graduate programme. 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 programme must include an extradepartmental Neuroscientist faculty member.

### C. Pharmacology/Industrial Research Experience

There is a possibility for MSc students to take a 3-4 month Industrial Research Rotation (5514.00) in a pharmaceutical company or government laboratory. This rotation will be under the joint guidance of a faculty member and a supervisor within the industrial/government laboratory and must be approved by the Department.

### D. PhD Pharmacology

Candidates must satisfactorily complete the class requirements listed for the MSc Pharmacology programme, plus 5507.03, two (2) additional 5600 half-credit classes or equivalents 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 programme. A comprehensive examination must be passed within the first year of admission into the PhD programme. Thesis research (9530.00) and preparation and oral defense of a thesis are required.

### E. PhD Pharmacology/Neurosciences

Candidates must satisfactorily complete the class requirements listed for the MSc Pharmacology/Neurosciences programme, 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 programme. A comprehensive examination must be passed within the first year of admission into the PhD programme. Thesis research (9530.00) and preparation and oral defense of a thesis are required. Student Advisory Committees for this programme must include an extradepartmental Neuroscientist faculty member.

### F. MD/PhD Pharmacology

Selected medical students with superior academic records who intend to pursue careers in biomedical research will be permitted to withdraw temporarily from medical school to pursue a programme of study leading to the PhD degree. Students will then return to medical school to complete the MD degree. The candidates must have a demonstrated interest in research. The following classes are required: 1 ancillary class, 3 specialty classes (5600 series), 5506.03, 5507.03, comprehensive examination, thesis research (9530.00), preparation and oral defense of a thesis. For information on the combined MD/PhD programme, see "Combined MD/PhD Programmes in the Faculty of Graduate Studies section of this calendar.

## III. Classes Offered

### 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, the cardiovascular system and the immune system. Drugs that assist or regulate host defence mechanisms will also be studied. Graduate students will be introduced to theoretical and practical considerations of drug-receptor interactions.

**NOTE: CLASS PRESENTLY UNDER REVISION - CONSULT DEPARTMENT**

### PHAC 5407.03: Introduction to Pharmacology II.

This class is intended to cover specific aspects of drug action not covered in PHAC 5406.03 and to provide students with practical experience in pharmacology and a perspective on pharmacological research. The laboratory component consists of practical exercises using various techniques, as well as computer simulations. The practicalities of drug marketing are briefly considered and there will be an opportunity to visit research laboratories. Students also will complete a research elective in a pharmacology research laboratory.

**NOTE: CLASS PRESENTLY UNDER REVISION - CONSULT DEPARTMENT**

**PREREQUISITE:** PHAC 5406.03 and instructor's consent

### PHAC 5408.03: Laboratory Exercises from 5407.03.

### PHAC 5506.03: Laboratory Demonstrating.

### PHAC 5507.03: PhD Lectures (2).

### PHAC 5514.00: Industrial Research Rotation.

### PHAC 5600's: Pharmacology Specialty Classes.

The advanced specialty classes offered to graduate students cover a variety of pharmacology topics. In each term several of these classes are offered allowing students to select advanced subjects which are of interest to them. \*Classes offered are subject to change. Please contact the Department.

### Offered in 2001-2002\*

- PHAC 5602.03: Cardiac Excitation and Contraction; Physiology and Pharmacology. G.R. Ferrier  
PHAC 5609.03: Anatomical and Molecular Neuropharmacology of the Basal Ganglia: the Scientific Basis for Grafting and Neural Transplantation. H.A. Robertson, I. Mendez  
PHAC 5610.03: Anesthesia. R. Hall  
PHAC 5612.03: Clinical Trial Design. J. Gray  
PHAC 5615.03: Transmembrane signal transduction in vertebrate cells. M.E. Kelly  
PHAC 5621.03: Pharmacology of Drug Abuse. G. McKenzie  
PHAC 5623.03: Clinical Pharmacology. J. Gray

### Offered in 2002-2003\*

- PHAC 5603.03: Neuropharmacology of Pain. J. Sawynok  
PHAC 5605.03: Role of the Brain's Immune/Inflammatory System in Disease. T.D. White  
PHAC 5606.03: Molecular Biology for Pharmacology.  
PHAC 5607.03: Advanced Topics in Cardiovascular Pharmacology. S.E. Howlett  
PHAC 5611.03: Cytochrome P450 Mediated Drug Metabolism. K.W. Renton  
PHAC 5616.03: Molecular Neuropharmacology. H.A. Robertson  
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 5621.03: Pharmacology of Drug Abuse. G. McKenzie  
PHAC 5623.03: Clinical Pharmacology. J. Gray

### PHAC 9000.00: MSc Thesis.

### PHAC 9530.00: PhD Thesis.

### 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

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Location: Burbidge Building  
5968 College Street  
Halifax, NS B3H 3J5  
Telephone: (902) 494-2378  
Fax: (902) 494-1396  
Website: [www.dal.ca/Pharmacy](http://www.dal.ca/Pharmacy)

### Director of College

Caldwell, R.K., BSc (Pharm), MSHA (Dal)

### Graduate Coordinator

Sketris, I.S.

### Professors Emeriti

Duff, J.G., BSP, MSc (Sask), PhD (Fla)

### Professors

Sketris, I.S., BSc (Pharm) (Toronto), PharmD (Minn), MPA (HSA) (Dal)  
Yeung, P.K.F., BSc (Pharm), MSc (Man), PhD (Sask)

### Associate Professor

Whelan, A.M., BSc(Pharm) (Dal), PharmD (MUSC)

### Assistant Professors

Droblitch, R., BSc (Windsor), BSc(Pharm), PhD (Wayne State)  
Jurgens, T., BSc(Pharm), MSc (Dal), PhD (Miss)  
MacKinnon, N.J., BSc (Pharm), MS (Wisconsin), PhD (Florida)

### Adjunct Professors

Jones, D., BSc, PhD (Birm), F.I.Ceram, FIM, C.CHEM, FRSC(UK),  
FADM, D.O.hc., major appointment in Faculty of Dentistry  
Kirumira, A.K., BSc (Mosul), MSc (Reading), PhD (Murdoch)  
Pollak, P.T., BSc, MD, PhD (UWO), FRCP  
Quilliam, M., BSc, PhD (Manitoba)

There will be no new admission in 2001/2002 to the MSc and PhD in Pharmacy programme. All graduate students currently enrolled in Masters and Doctoral programmes should refer to the 1996/97 Graduate Studies calendar for programme regulations and class descriptions.

# Philosophy

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Location: 6135 University Avenue  
Halifax, NS B3H 4P9  
Telephone: (902) 494-3810  
Fax: (902) 494-3518  
E-mail: dalphil@is.dal.ca  
Website: <http://www.dal.ca/~philwww/hmpage/philgrad.htm>

## Chairperson of Department

Campbell, R.

## Graduate Coordinator

Campbell, S.

## Professor Emeritus

Braybrooke, D., BA (Harvard), MA, PhD (Cornell) FRSC. Political Philosophy

## Professors

Burns, S.A.M., BA (Hons) (Acadia), MA (Alberta), PhD (London).  
Interests: Wittgenstein, Plato, aesthetics, political philosophy  
Campbell, R.M., BA (Harvard), PhD (Cornell). Interests: Moral and political philosophy, philosophy of mind, and philosophy of biology  
Martin, R.M., BA (Columbia), MA, PhD (Michigan). Interests:  
Philosophy of language, analytical metaphysics, and practical 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. Interests: Feminist theory, bioethics, ethics  
Vinci, T., BA (Toronto), PhD (Pittsburgh). Interests: Epistemology, philosophy of science, history of modern philosophy, decision theory

## Associate Professors

Baylis, F., BA (McGill), MA, PhD (Western). (Cross-appointment with the Faculty of Medicine) Interests: Research ethics, paediatric ethics, feminist ethics, genetics, women's health  
Brett, N.C., BA (New Hampshire), MA, PhD (Waterloo). Interests: Philosophy of law, ethics, theories of human nature, modern philosophy  
Campbell, S., BA, MA (Alberta), PhD (Toronto). Interests: Philosophy of mind, feminist theory, aesthetics, ethics  
Hymers, M. BSc, MA (Dal), PhD (Alberta). 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

Cash, M., BSc, MA (Massey), PhD (Alberta). Interests: Philosophy of mind, philosophy of language  
Rose, P., BA (Memorial), MA, PhD (Queen's)

## Adjunct Professors

Kernohan, A., MA (Dal), PhD (Toronto). Political Philosophy  
Maitzen, S.A., BA (Northwestern), MA, PhD (Cornell)

Each student's programme 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 Co-ordinator in the Department.

## I. Admission Requirements

Candidates must satisfy the general requirements for admission to the Faculty of Graduate Studies.

## II. Degree Programmes

### A. Master of Arts (MA)

#### One Year

For students with an Honours BA or equivalent in philosophy. Requirements include three classes\* and a thesis.

#### Two Year

For those with an honours degree in a related field. Requirements include four classes\* in the first year, three in the second, and a thesis.

#### Part-Time

A part-time MA over a longer period is available for fully qualified students.

\*NOTE: A "class" means one full-year or two half-year classes.

### B. Doctor of Philosophy (PhD)

For students with an MA in philosophy.

For minimum time required to complete this programme, see the Faculty of Graduate Studies regulations. Normally, the doctoral student will be required to attend three graduate seminars beyond the requirements for the MA. Reading knowledge will usually be required in one language other than English in which a significant body of philosophical literature exists. There are three comprehensive examinations to be completed in (1) ethics and political philosophy; (2) metaphysics, epistemology, philosophy of language and science; (3) logic and philosophy of logic. Completion of the programme 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, philosophy of mind, feminist philosophy, political and social philosophy, philosophy of language, or logic.

## III. Classes Offered

The Philosophy Department offers four kinds of graduate classes; adjunct, general, seminar, and directed reading. Adjunct classes presuppose no prior preparation in the area covered by the class. Thus, a graduate student with no previous training in modern symbolic logic could take the combination 2130.03 and 2140.03 which provides a comprehensive introduction to this subject. These classes, since they are not intended for advanced study in the area designated, are open to graduate students in philosophy only in special cases and by permission of the Department. *General* classes cover a wide range of topics and presuppose some previous study in the area covered by the class. They are suitable for graduate students who want to deepen their understanding of a general area of study but have not specialized in it as an undergraduate. *Seminar* classes are relatively narrow in focus and presuppose extensive previous study in the area. *Directed Reading* classes are developed jointly by a student and an instructor in special cases to suit individual interests and needs. These 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, Rationalism, and Empiricism, and investigates the nature of knowledge, belief, meaning, evidence, and truth. Questions are raised about perception and memory and their relation to knowledge as well as questions about our knowledge of ourselves and other people. Attention is given to ancient and modern authors. INSTRUCTORS: R. Campbell, D. MacIntosh, T. Vinci  
FORMAT: Lecture/discussion 3 hours  
CROSS-LISTING: PHIL 3051.03

**PHIL 5060.03: Logic: Logical Theory II.**

Devoted primarily to the study of formal semantics and its relation to symbolic language.

INSTRUCTOR: P.K. Schotch

FORMAT: Lecture/discussion 2 hours

PREREQUISITE: PHIL 2130.03, PHIL 2140.03 or permission of the instructor

CROSS-LISTING: PHIL 3060.03

**PHIL 5105.03: Ethics.**

A systematic study of the foundation of morality, including readings from Kant, *Foundation of the Metaphysics of Morals*; Hume, *A Treatise of Human Nature*; and Rawls, *A Theory of Justice*.

INSTRUCTOR: N. Brett, R. Campbell, S. Campbell, D. MacIntosh

FORMAT: Lecture/discussion 2 to 3 hours

EXCLUSION: PHIL 3100.06

CROSS-LISTING: PHIL 3105.03

**PHIL 5170.03: Theories of Feminism.**

A study of the theoretic underpinning of the major feminist theories in critical comparison, concentrating on the ideological disputes and the implications for traditional approaches to social and political thought.

INSTRUCTOR: S. Campbell, S. Sherwin

FORMAT: Seminar 2 hours

CROSS-LISTING: WOST 3500.03, 5170.03, PHIL 3170.03

**PHIL 5211.03: Philosophy of Law.**

Is coercion central to the concept of 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: N. Brett

FORMAT: Lecture/discussion 3 hours

CROSS-LISTING: PHIL 3211.03

**PHIL 5265.03: Aesthetics.**

This class examines major texts in philosophical aesthetics. We begin with relevant parts of Kant's *Critique of Judgment* and conclude with a consideration of Wittgenstein's contribution, especially in *Lectures and Conversations*, and *Culture and Value*.

INSTRUCTOR: S.A.M. Burns, S. Campbell

FORMAT: Lecture

CROSS-LISTING: PHIL 3265.03

**PHIL 5300.03: Philosophy of Language.**

What does it mean to say that the elements of language have meaning?

INSTRUCTORS: D. MacIntosh, R. Martin, M. Hymers

FORMAT: Lecture/discussion, 2 hours

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 ten leading issues in the philosophy of biology: 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 illusive? Is there a human nature? Is genuine altruism possible given the forces of selection? What is the scientific and moral significance of the human genome project? Is there progress in evolution? How should clashes between faith and reason over the nature of our evolution be resolved?

INSTRUCTOR: R. Campbell

FORMAT: Lecture/discussion 2 hours

CROSS-LISTING: BIOL 3580.03, PHIL 3420.03

**PHIL 5440.03: Philosophy of Mind.**

A systematic study of the mind-body problem and/or theories of personal identity. In 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. Campbell

FORMAT: Lecture/discussion 2 hours

CROSS-LISTING: PHIL 3440.03

**PHIL 5460.03: Mind, Brain and Cognitive Science.**

An interdisciplinary approach, combining philosophical analysis and neuroscientific data to study current controversies about the relation between brain function and conscious experience, such as why consciousness evolved and how it is organized in the normal human brain, and whether the mental can be construed as itself physical.

INSTRUCTOR: M. Cash

FORMAT: Lecture/discussion 2 hours

CROSS-LISTING: PHIL 3460.03

**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 actions.

INSTRUCTORS: P. Schotch, D. MacIntosh

FORMAT: Lecture/discussion 2 hours

CROSS-LISTING: PHIL 3530.03

**PHIL 5630.03: History of Philosophy: Kant.**

Special attention will be paid to Kant's metaphysics.

INSTRUCTOR: T. Vinci

FORMAT: Lecture/discussion 2 hours

CROSS-LISTING: PHIL 3630.03

**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 Frege, Russell, Wittgenstein, and Quine.

INSTRUCTOR: D. MacIntosh

FORMAT: Lecture/discussion 2 hours

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: T. Vinci

FORMAT: Lecture/tutorial

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 writing of post-Wittgenstein philosophers like Sellars and Rorty in the English-speaking world as well as those like Derrida and Habermas on the Continent.

INSTRUCTORS: M. Hymers, T. Vinci

FORMAT: Lecture/tutorial

CROSS-LISTING: PHIL 3660.03

**PHIL 5670.03: Philosophy of Science.**

Induction, probability, and explanation are studied with special attention to the nature of scientific theories. No scientific background is presupposed.

INSTRUCTORS: M. Cash, D. MacIntosh

FORMAT: Lecture/discussion

CROSS-LISTING: PHIL 3670.03

**PHIL 5801.03: Topics in Ethics and Health Care.**

An in-depth look at some questions in health care ethics.

INSTRUCTOR: S. Sherwin

CROSS-LISTING: PHIL 4801.03

**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: M. Hymers, P. Rose

FORMAT: Lecture/discussion

CROSS-LISTING: PHIL 3851.03

**PHIL 5900.03: Logic: Logic and Philosophical Analysis.**

This class will examine the application of logical theory to philosophical problems and issues in the philosophy of logic. Topics in this area include: reference and definite descriptions, problems of intensionality, relativized identity and sortals, bivalence and the sorites paradox, logicism and set theoretic paradoxes, trans-world identity, paradoxes of confirmation, counterfactuals, multivalued logic, quantum logic, Arrow's theorem, analyticity and the a priori, negative existentials.

INSTRUCTOR: R. Campbell

FORMAT: Lecture/discussion

CROSS-LISTING: PHIL 3900.03

**Seminar Classes**

Seminar classes are advanced level topic classes designed for graduate students. Instructors and topics can vary yearly. Examples of current and past class descriptions are maintained on the department's web page.

**PHIL 5055.03: Topics in Epistemology.**

INSTRUCTOR: M. Hymers

**PHIL 5070.03: Topics in Philosophical Psychology.**

INSTRUCTOR: S. Campbell

**PHIL 5080.03: Topics in Logical Theory.**

INSTRUCTOR: P.K. Schotch

**PHIL 5115.03: Topics in Ethics I.**

INSTRUCTOR: R. Campbell

**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.

INSTRUCTORS: R. Campbell, D. MacIntosh

FORMAT: Seminar

**PHIL 5125.03: Topics in Ethics II.****PHIL 5190.03: Topics in the History of Philosophy I.**

INSTRUCTOR: S. Burns

**PHIL 5191.03: Topics in the History of Philosophy II.**

INSTRUCTOR: T. Vinci

**PHIL 5192.03: Topics in the History of Philosophy III.**

INSTRUCTOR: N. Brett

**PHIL 5200.03: Topics in Normative Theory.**

INSTRUCTOR: R. Campbell

**PHIL 5215.03: Topics in Philosophy of Law.**

INSTRUCTOR: N. Brett

**PHIL 5220.03: Contemporary Philosophical Issues.**

Intensive study of a few topics which are currently being debated and may fall outside or cut across standard classification of areas of interest. Examples are: evolution and value, artificial intelligence, probability, theories of causation, supervenience.

INSTRUCTOR: R. Campbell

FORMAT: Seminar

**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: N. Brett

FORMAT: Seminar

CROSS-LISTING: POLI 5470.03, ECON 5446.03

**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: R. 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, such as feminist ethics, feminist epistemology, feminist philosophy of science, or postmodern feminism.

INSTRUCTOR: S. Campbell, S. Sherwin

FORMAT: Seminar

CROSS-LISTING: WOST 5500.03

**PHIL 5510.03: Topics in Philosophy of Language.**

INSTRUCTOR: M. Hymers

**PHIL 5680.03: Topics in Philosophy of Science.**

INSTRUCTOR: T. Vinci

**PHIL 5855.03: Topics in Metaphysics.**

INSTRUCTOR: R. Martin

**PHIL 5960.03/5980.03; 5970X/Y.06/5990X/Y.06: Directed Reading Class.****PHIL 9000.00: MA Thesis.****PHIL 9530.00: PhD Thesis.**

# Physics

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Location: Sir James Dunn Science Building  
Halifax, NS B3H 3J5  
Telephone: (902) 494-2337  
Fax: (902) 494-5191  
Website: www.physics.dal.ca  
E-mail: physics@dal.ca

## Chairperson of Department

Kiang, D.B.I. (494-2315)

## Graduate Advisor

Dunlap, R.A. (494-2394)

## Professors Emeriti

Archibald, W.J., MA (Dal), PhD (Virg), DSc (UNB), LLD (Dal),  
FRSC

Betts, D.D., BSc, MSc (Dal), PhD (McGill), FRSC - Research

## Professors

Blackford, B.L., BSc (Acadia), MSc (MIT), PhD (Dal) - Research  
Chylek, P., Physics Diploma (Charles, Prague), PhD (Calif,  
Riverside), joint appointment with Oceanography

Coley, A.A., PhD (London), cross appointment with Mathematics  
and Statistics

Dahn, J.R., BSc (Dal), MSc, PhD (UBC), NSERC/3M Canada Inc.  
Industrial Research Chair, cross appointment with Chemistry

Dunlap, R.A., BS (Worcester), AM (Dartmouth), PhD (Clark)

Geldart, D.J.W., BSc (Acadia), PhD (McMaster), FRSC - Research

Jericho, M.H., BSc, MSc (Dal), PhD (Cantab), FRSC, George Munro  
Professor of Physics

Kiang, D.B.I., BSc (MtA), MSc, PhD (McMaster)

Kreuzer, H.J., MSc, DSc (Bonn), FRSC - A.C. Fales Professor of  
Theoretical Physics

Langstroth, G.F.O., BSc (Alta), MSc (Dal), PhD (London), Assistant  
Dean, Faculty of Science

Moriarty, K.J.M., BSc (St. Mary's), MSc (Dal), DIC, PhD (Imperial  
College), joint appointment with MSCS

Paton, B.E., BSc, MSc (Waterloo), PhD (McGill)

Reynolds, P.H., BSc (Toronto), PhD (UBC), cross appointment with  
Earth Sciences

Stroink, G, BSc, MSc (Delft), PhD (McGill), PEng, cross  
appointment with Physiology and Biophysics

White, M.A., BSc (UWO), PhD (McMaster), cross appointment with  
Chemistry

## Associate Professors

Cordes, J.G., BSc, MSc (Dal), PhD (Cantab)

Folkins, I., BSc (Dal), MSc, PhD (Toronto), cross appointment with  
Oceanography

Goble, D.F., BSc, MSc (Alta), PhD (Toronto), BEd (Dal)

Labrie, D., BSc (Montreal), MSc, PhD (McMaster)

Lee, J.M., BSc (UNB), PhD (Western Ontario), cross appointment  
with Applied Oral Sciences

Tindall, D.A., BA, PhD (Cantab)

## Assistant Professor

Hale, M., PhD (UNB), cross appointment with Radiation Oncology,  
Dalhousie

Lohmann, U., MSc, PhD (Hamburg), joint appointment with  
Oceanography

Rutenberg, A.D., BSc (Toronto), PhD (Princeton)

Wells, S.M., BSc (Western), PhD (Toronto), (NSERC University  
Faculty Award)

## Adjunct Professors

Charbonneau, S., PhD (Simon Fraser), National Research Council of  
Canada

Denton, A., PhD (Cornell), Physics, Acadia U.

Lawther, D.W., PhD (Dal), Physics, UPEI

Leaitch, R., PhD (York), Atmospheric Environment Services

Pink, D.A.H., PhD (UBC), Physics, StFX.

Purcell, C.J., PhD (Dal), Defense Research Establishment Atlantic

Steinitz, M., PhD (Northwestern), Physics, StFX.

## Research Associates

Das, A.K., DPhil (Oxon)

Lesins, G.B., PhD (Toronto)

Payne, S.H., PhD (Cantab)

Senba, M., PhD (Rutgers)

Wang, R.L., PhD (Dal)

## Postdoctoral Fellows

Cheng, Z-h., PhD (Chinese Academy of Sciences, Beijing)

Hewitt, K., PhD (Simon Fraser)

Lu, Z., PhD (Chinese Academy of Sciences, Beijing)

Xu, W., PhD (La Trobe University)

## MacGregor Teaching Fellows

Bonarkdarpour, A.

McEwen, J.S.

O'Brien, J.

Whittingstall, K.

## I. 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 programme. 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.

## II. Degree Programmes

### A. Master of Science (MSc)

For minimum time required to complete this programme, see the Faculty of Graduate Studies regulations in this calendar.

At least two full credit classes are required, of which at least one must be at the 6000 level.

Research, preparation, and oral defense of a thesis are required.

### B. Doctor of Philosophy (PhD)

For minimum time required to complete this programme, 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.

## III. Classes Offered

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: Electrodynamics.**

Topics include the wave equation and solutions, waves at metallic boundaries, the inhomogeneous wave equation, radiation from moving charges, scattering and dispersion

FORMAT: Lecture 3 hours

PREREQUISITE: PHYC 2010.03, 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 3140.03. Topics include: time-independent perturbation theory, the variational principle, the WKB approximation, time-dependent perturbation theory, scattering.

FORMAT: Lecture 3 hours

PREREQUISITE: PHYC 3140.03

### **PHYC 5152.03: Quantum Physics III.**

Selected topics from: angular momentum and tensor operators, many-body problem, symmetry and invariance, path integral approach and relativistic quantum mechanics.

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: MATH 3110.03/3120.03 or permission of 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 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 3140.03 or permission of 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 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 3140.03 or permission of 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 instructor

CROSS-LISTING: OCEA 5311.03

### **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 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. An introduction to numerical techniques and their use in weather forecasting models and studies of climate is included. Additional special topics are covered at the discretion of the instructor.

FORMAT: Lecture 3 hours

PREREQUISITE: PHYC 5411.03, or permission of instructor

CROSS-LISTING: OCEA 5412.03

### **PHYC 5500.03: Atmospheric Physics I.**

Main topics covered in this class are atmospheric thermodynamics and atmospheric radiation.

FORMAT: Lecture 3 hours

PREREQUISITE: At least one 3rd year physics class, preferably thermodynamics

CROSS-LISTING: OCEA 5500.03

### **PHYC 5510.03: Atmospheric Physics II.**

The major topics covered in this class are cloud and aerosol physics. Other topics include atmospheric optics, atmospheric acoustics, lightning and radar techniques.

FORMAT: Lecture 3 hours

PREREQUISITE: PHYC 4500.03, or permission of instructor

CROSS-LISTING: OCEA 5510.03

### **PHYC 5520.03: Introduction to Atmospheric Science.**

This class 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: Permission of instructor

CROSS-LISTING: OCEA 5520.03

### **PHYC 5540.03: Synoptic Meteorology I.**

This class introduces principles and techniques of meteorological analysis, diagnosis of weather systems and prognosis of system motion and development. A brief review is presented on meteorological instrumentation, observational procedures, codes and analysis techniques essential to the study of the main subject matter. 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 5550.03: Synoptic Meteorology II.**

This class extends the analysis and diagnosis of atmospheric dynamics and weather processes introduced in PHYC 5540.03. Modern statistical and computer methods and satellite techniques are discussed. Case studies of atmospheric systems and processes are carried out during the tutorial-laboratory period.

FORMAT: Lecture 2 hours, tutorial-lab 3 hours

PREREQUISITE: PHYC 5540.03

CROSS-LISTING: OCEA 5550.03

### **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 Schwarzschild Solution, gravitational collapse, black holes, and cosmology.

FORMAT: Lecture 3 hours

PREREQUISITE: MATH 3050.06 or permission of 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 instructor

CROSS-LISTING: MATH 5410.03

### **PHYC 6121.03: Quantum Theory.**

Topics covered include quantum dynamics, angular momentum and tensor operators, scattering theory, many-body systems.

FORMAT: Lecture 3 hours

PREREQUISITES: PHYC 4151.03 and 4152.03, or permission of 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 instructor

### **PHYC 6261.03: Statistical Mechanics I.**

Topics: quantum statistics; canonical and grand canonical ensemble; Bose-Einstein condensation; fermi liquids; lattice statistics and critical phenomena; transport and irreversibility, Boltzmann equation.

FORMAT: Lecture 3 hours

PREREQUISITES: PHYC 3210.03 and 4151.03, or permission of instructor

### **PHYC 6262.03: Statistical Mechanics II.**

This class is a continuation of PHYC 6261.03.

FORMAT: Lecture 3 hours

PREREQUISITES: PHYC 6261.03, or permission of 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 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 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 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 instructor

### **PHYC 6570.03: Light Scattering and Radiative Transfer.**

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.

FORMAT: Lecture 3 hours

PREREQUISITE: Permission of instructor

CROSS-LISTING: OCEA 5570.03

### **PHYC 6575.03: Topics in Atmospheric Radiation.**

This advanced graduate class will focus on current research topics in atmospheric radiation. The fundamental theory of light scattering and radiative transfer 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 instructor

CROSS-LISTING: OCEA 5575.03

### **PHYC 6580.03: Cloud Physics.**

A detailed examination of the behaviour of condensed water in the atmosphere. Micro physical 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 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 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 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 instructor

### **PHYC 9000.00: MSc Thesis.**

### **PHYC 9530.00: PhD Thesis.**

# Physiology and Biophysics

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Location: Sir Charles Tupper Building, Third Floor  
Halifax, NS B3H 4H7  
Telephone: (902) 494-3517  
Fax: (902) 494-1685

## Head of Department

Holland, J.G.

## Graduate Coordinator

Croll, R.P.

## Professors Emeriti

MacLeod, E., MD (Dal)  
Szerb, J.C., MD (Munich), FRCP(C)

## Professors

Armour, J.A., BSc (McGill), MD (Western), PhD (Loyola). Neural control of the heart; coronary circulation; myocardial mechanics

Barnes, S.A., PhD (Berkeley). Retinal neurobiology; ion channel function in synaptic communication; novel neuromodulators and neural messengers

Croll, R.P., BSc (Tufts), PhD (McGill). Physiology and functional anatomy of invertebrate nervous systems; analyses of motor programme 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.

Horacek, B.M., MSc(Eng) (Prague), PhD (Dal). Quantitative cardiac electrophysiology; body surface potential mapping; the inverse problem of electrocardiography and magnetocardiography

Horackova, M., MSc, PhD (Prague). Cellular cardiology; excitation and contraction; regulation of calcium transport

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.

Moger, W.H., BS (Cornell), PhD (Calif). Physiological correlates of social behaviour in wild canids.

Murphy, P.R., MSc, PhD (Dal). FGF; growth factors; gliomas; lymphomas; gene therapy; antisense

Pelzer, D., Dr Med (Heidelberg), Priv-Doz in Physiology (Homburg). Channel function; pharmacology (cardiovascular drugs) and modulation (transmitters, second messengers, G-proteins) of Ca<sup>2+</sup> Channels; intracellular Ca<sup>2+</sup> imaging

Rasmusson, D., BA (Colo C), MA, PhD (Dal). Plasticity in the central nervous system; acetylcholine release

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

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.

Kozey, C.L., BPE (UNB), MSc (Waterloo), PhD (Dal), major appointment, School of Physiotherapy. Digital signal processing of electrophysiological measures: diagnostic classification based on electrocardiographic measures, electromyographic pattern recognition approaches to studying normal and abnormal human movements.

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

## Assistant Professors

Landymore, K., BSc, MD, PhD (Dal), major appointment Department of Obstetrics/Gynecology. New reproductive technologies.

Linsdell, P., BSc (London), PhD (Leicester). Ion channel biophysics; chloride channel structure and function; epithelial transport; cystic fibrosis

Torkkeli, P.H., BSc, MSc, LcSc (Oulu), PhD (Alta). Mechanosensitive, voltage- and ligand-gated ion channels in mechanosensory neurons, central control of mechanosensation.

Tremblay, F., BSc, PhD (Montréal), major appointment, Department of Ophthalmology. Neurobiology of vertebrate retina, neuroprotection.

Villarroel, A., BS, MS (Chile), PhD (UCLA). Ligand-gated ion channels; coupling of electrical activity to gene expression

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

Candidates must satisfy the general requirements for admission to the Faculty of Graduate Studies.

The following constitutes the minimum entrance requirements for the graduate programme in Physiology and Biophysics:

- (a) An average mark of B+, with no mark below B- in the following basic undergraduate classes or their equivalent:
- MATH 1000.03/1010.03 (differential and integral calculus)
  - PHYC 1100X/Y.06 (using differential calculus)
  - CHEM 1010X/Y.06 (general chemistry)
  - STAT 1060.03/1070.03 (basic statistics for scientists)
  - BIOL 1000X/Y.06 (general biology)
  - Expository English (essay writing class)
- b) A minimum average mark of A- over the last two years of the student's undergraduate programme.

Unless exempted, applicants must also provide the Department with an official copy of the results of the Graduate Record Examination General (Aptitude) Test and one Subject (Advanced) Test.

## II. Degree Programmes

### A. Master of Science (MSc)

For the minimum time required to complete this programme, see the Faculty of Graduate Studies regulations. However, students should expect to spend two years working toward the MSc.

All students must take PHYL 5517.03 (Graduate Seminar), PHYL 5521.03 (Molecular Physiology) and PHYL 5459.03 (Cellular Biophysics). All students must also take an additional three half credits, at least one of which must be chosen from the classes listed below.

Students who have not completed upper level classes in cellular and membrane physiology with at least a grade of B- will be required to complete PHYL 4320.03 (Core Concepts in Cell Physiology).

Students who have not completed upper level classes in human physiology with at least a grade of B- will be required to complete PHYL 5323.03 (Human Physiology: The Mechanisms of Body Functions.)

A research thesis which constitutes two credits is required.

### B. Doctor of Philosophy (PhD)

For minimum time required to complete this programme, see the Faculty of Graduate Studies regulations.

Selected classes of this or other departments may be required.

A preliminary examination in the field of thesis research is required.

Research and the preparation and defense of a thesis are required.

A candidate must demonstrate the ability to carry out research of high quality leading to an advance in knowledge of physiology and biophysics.

### 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 Programme. Please see section on Interdisciplinary and joint programmes, p. 157.

### D. Doctor of Philosophy/Doctor of Medicine (MD/PhD)

For information on the combined MD/PhD programme see Interdisciplinary PhD Programme, page 157.

## III. 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. Students are expected to present 1 lecture to an undergraduate class during their second year in the programme and 2 lectures in subsequent years. This teaching will be evaluated by the class director and a copy of the evaluation placed in the student's file.

## IV. Classes Offered

### Neuroscience

The following classes are offered through the interdisciplinary neuroscience programme:

#### 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 behavioural neurobiology and will cover topics such as visual and somatosensory systems, motor programme generation, autonomic and neuroendocrine functions, motivation, learning, circadian rhythmicity 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.

INSTRUCTORS: S. Barnes, K. Semba, D. Rasmusson

#### 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 programmes. Please see class description of NESC 6100X/Y.06.

### Physiology

#### 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 Honours science students and graduate students.

DIRECTOR: M. Horackova

FORMAT: Lectures supplemented with tutorials

EXAMINATIONS: Two written examinations (mid-term and final, 50% each)

PREREQUISITES: PHYL 4320.03 or knowledge of basic cellular physiology, and approval of the class director

#### PHYL 5459.03: Cellular Biophysics.

This class provides specialized information on the structure and function of ion channels and transporters (carriers, pumps) in cell membranes as well as their role in cellular responses to membrane excitation and other stimuli. The topics include: membrane structure and properties; membrane transport processes, ion channel structure and function, water transport, action potential initiation and conduction, synaptic transmission, excitation-contraction and excitation-secretion coupling.

INSTRUCTOR: D.J. Pelzer

FORMAT: Lectures 4 hours

EXAMINATIONS: Mid-term exam (40%) and end of term exam (60%)

PREREQUISITE: PHYL 4320.03, vertebrate physiology class, or permission of the class director

#### PHYL 5494.03: Synaptic Transmitters.

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.

INSTRUCTORS: M. Wilkinson and K. Semba

FORMAT: Lecture

PREREQUISITES: PHYL 2030.03; fourth year honours; a graduate programme in another department

#### 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: Individual faculty members in liaison with R.P. Croll (Graduate Coordinator)  
PREREQUISITE: Permission of the Director

### **PHYL 5512.03: Physiology and Biophysics of the Heart and Circulation.**

Offered every second year, or on demand, next offered 2002/2003. The class provides an exposure to broad aspects of cardiovascular physiology/biophysics in areas where local expertise exists. Topics covered include: synopsis of the history of cardiovascular physiology; cardiac structure, function and metabolism; hemodynamics; neural and hormonal control; fetal/neonatal life; space/underwater cardiovascular physiology; cardiovascular response to hypo- and hyperthermia; cardiac electrophysiology; electrical instability problems; aging of the cardiovascular system; and risk factors for heart attack and heart failure. The class includes lectures, student presentations, and laboratory exercises.  
INSTRUCTOR: D. Armour.  
PREREQUISITE: PHYL 2030X/Y.06 completed or concomitant, and permission of the Director

### **PHYL 5513.03: Endocrine Physiology.**

Offered every second year; next offered in 2002/2003. This class provides an in-depth survey of Endocrinology with emphasis on recent developments. Topics include: the mechanisms of hormone action; physiology of the hypothalamic-pituitary axis; thyroid and adrenal physiology; endocrine control of mineral and energy metabolism. Seminars will deal with fundamental aspects of these topics derived from reading recent textbooks of Endocrinology, as well as advanced aspects from reading review articles and research papers.  
INSTRUCTOR: W. Moger  
PREREQUISITE: PHYL 2030X/Y.06 completed or concomitant, or equivalent, or permission of Director

### **PHYL 5514.03: Reproductive Physiology.**

Offered every second year, next offered in 2001/2002. 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.  
INSTRUCTORS: M. Wilkinson, W. Moger and K. Landymore  
PREREQUISITE: PHYL 2030X/Y.06; fourth year honours; graduate students (permission of class Director)

### **PHYL 5517.03: Physiology and Biophysics Graduate Seminar.**

A mandatory class that all graduate students attend throughout their studies in the Department. The objectives of the class are to provide opportunities for students to acquire experience in giving lectures to scientific audiences, in giving scheduled lectures to undergraduate students, and in assimilating and evaluating scientific information presented by others.

There are four components of the class:

1. The Physiology and Biophysics Departmental Seminar. There are several seminars per year and attendance is mandatory for all class registrants. Students are often given the opportunity to meet informally with guest speakers.
2. A separate weekly graduate student seminar series forms the central component of the class. These seminars cover selected topics determined by the participants in an organizational meeting held in September. Aside from research-related presentations by the students themselves, invited speakers may present seminars on topics related to communication by academics (e.g. teaching techniques, use of audio-visual aids, writing grant proposals, writing scientific papers), research methodologies (e.g. experimental design, theories of data acquisition and analysis), animal ethics, etc.
3. Each student in 5517.03 must present at least one departmental seminar during their degree programme. Each student's seminar is monitored by a faculty committee selected by the Graduate Education Committee to ensure that the student receives oral and written feedback on his/her presentation.

4. Each registrant beyond the first-year MSc level must normally present one lecture per year in one of the non-medical undergraduate Physiology classes (PHYL 1010X/Y.06, 2030X/Y.06, 3110.03 or 3120.03). Each lecture is attended by an advisory teacher who evaluates it in terms of structure, clarity of presentation, general effectiveness, etc., and provides oral and written feedback to the student.

INSTRUCTOR: R.P. Croll

### **PHYL 5518.03: Ligand-gated Ion Channels.**

Offered every second year, or on demand, next offered 2002/2003. This half-credit class analyzes the basic properties of ligand-gated ion channels, in particular those that participate in synaptic transmission. The class will examine the properties of ligand-gated channels as presented in current scientific articles, which will be discussed in each session. The nicotinic acetylcholine receptor, as well as the GABA, AMPA, Kainate, NMDA, and serotonin 5-HT<sub>3</sub> receptors will be treated in detail. Evaluation will be based on the presentations and discussions, and the submission of a short written essay on one of the topics discussed.  
INSTRUCTOR: A. Villarroel.  
PREREQUISITE: Permission of the Director

### **PHYL 5521.03: Molecular Physiology.**

Offered every second year, next offered in 2002/2003. 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: P.R. Murphy (Director) and staff  
FORMAT: Lecture, seminar and guided reading  
PREREQUISITES: 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: Individual faculty members in liaison with R.P. Croll (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

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Location: Forrest Building, 4th Floor  
Halifax, NS B3H 3J5  
Telephone: (902) 494-2524  
Fax: (902) 494-1941

## Director

Makrides, L., BPT (Sask), MSc (Ottawa), PhD (McMaster), MCSP

## Graduate Coordinator

McLean, L., BScPT (McGill), MSc, PhD (UNB)

## Professors

Egan, D., MCSP, Dip. T.P. (England), MSc (UWO), PhD (Curtin)  
Makrides, L., BPT (Sask), MSc (Ottawa), PhD (McMaster), MCSP  
Turnbull, G.I., MSCP, DipTP, BPT (Man), MA (Dal), PhD (Rhodes)

## Associate Professor

Kozey, C.L., BPE (UNB), MSc (Waterloo), PhD (Dal)

## Assistant Professors

Earl, M., BScPT (UWO), BSc, MSc, PhD (Waterloo)  
Fenety, A., BSc (UNB), DPT (Manitoba), MSc (Alta), PhD (Dal)  
Harman, K., BScPT (Toronto), MSc (Ottawa), PhD (Carleton)  
MacKay-Lyons, M., BSc(PT) (Toronto), MScPT (USC), PhD (Dal)  
McLean, L., BScPT (McGill), MSc, PhD (UNB)

## Adjunct Professor

Walker, J.M., Certs Phys. Ther. (NZ), DipTP, BPT, MA (Man), PhD (McMaster)

## I. Introduction

A programme of study leading to a Master of Science in Physiotherapy is offered through the School of Physiotherapy. In addition to the requirements for the Faculty of Graduate Studies, applicants must be licensed physiotherapists with a university degree and a B average or higher in four Physiotherapy undergraduate classes taken at the university level. Applicants must include a statement of goals and graduate research area with their application to the programme. Successful applicants will be chosen by the School's Graduate Committee. Foreign applicants must meet the English language competency requirements as outlined by Graduate Studies.

## II. Application

Applicants must

- Complete the application form for admission to the Faculty of Graduate Studies
- Include a one page statement of experience, goals and objectives with the application
- Meet the English language competency requirements as outlined by Graduate Studies.
- 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

- Include a copy of a recent paper authored in the area in which the applicant is planning to pursue studies (if available)
- Submit a recent GRE score

## III. Admissions and Programme Requirements

### A. Programme Requirements

Students registered in the programme 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-credit classes are required. The other three half-credit classes will be selected based on the individual programme of study approved by the Supervisory Committee. Graduate students are also expected to attend several Physiotherapy Research Seminars.

### C. Residency

It is expected that upon completion of the class work an additional year will be required to complete the thesis. Students are expected to spend at least one year full-time in the program.

### D. 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 programme.

### E. Application Inquiries

For more information regarding admission and programme requirements, please write to the Graduate Coordinator, School of Physiotherapy, Dalhousie University, Halifax, NS, B3H 3J5.

## IV. Classes Offered

An approved half credit class in Statistical Methods and/or Research Design (required).

### PHYT 5002.03: Instrumentation and Measurement.

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. (Required.)

INSTRUCTOR: C. Kozey

FORMAT: Lecture/lab and discussion

### PHYT 5010.03: Special Topics in Musculoskeletal II.

### PHYT 5030.03: Special Topics in Neurology I.

### PHYT 5050.03: Special Topics in Cardiac Rehabilitation III.

### PHYT 5070.03: Directed Studies.

### PHYT 5080.03: Directed Studies.

Special Topics in Physiotherapy I, II, III

### PHYT 5090.03: Foundations Seminar.

This class will provide students with the opportunity to study the development of the profession of physiotherapy from ancient times to the present. Models of physiotherapy delivery 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 to enhance the time and cost efficiency of total physiotherapy care will be considered as will the influencing of health-care policy formulation. Emphasized will be the delivery of physiotherapy to a variety of client populations in non-institutional contexts. (Required.)

INSTRUCTOR: G. Turnbull

### PHYT 9000.00: Thesis (Required).

# Political Science

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Location: Arts & Administration Building  
Third Floor  
6299 South Street  
Halifax, NS B3H 4H6  
Telephone: (902) 494-2396  
Fax: (902) 494-3825  
Website: <http://is.dal.ca/~finbow/gradprog.htm>

## Chairperson of Department

Cameron, D.M.

## Graduate Co-ordinator

Finbow, R.

## Professors Emeriti

Beck, J.M., BA (Acadia), MA, PhD (Toronto), LLD (Dal), FRSC  
Braybrooke, D., BA (Harvard), MA, PhD (Cornell), FRSC  
Eayrs, J.G., BA (Toronto), AM, PhD (Col), FRSC  
Mann Borgese, E., DipMus (Zurich), LHD (MSVU)

## Professors

Aucoin, P.C., BA (SMU), MA (Dal), PhD (Queen's), jointly with Public Administration. Public administration (policy processes, government organization, management systems); Canadian political institutions  
Bakvis, H., BA (Queen's), MA, PhD (UBC), jointly with Public Administration. Public administration - Federalism (Canadian and comparative); Political parties, electoral behaviour  
Boardman, R., BSc, PhD (London). International organization, European Politics, Environment  
Cameron, D.M., BA (Queen's), MA, MPhil, PhD (Toronto). Canadian federalism and intergovernmental relations; Canadian public policy; city government  
MacFarlane, N., AB (Dartmouth), MA, MPhil, DPhil (Oxford), International organization, humanitarian action, regional security in the former USSR.  
Middlemiss, D.W., BA, MA, PhD (Toronto). Canadian defence policy (especially defence economies and Maritime strategy); Canadian foreign policy  
Shaw, T.M., BA (Sussex), MA (East Africa, Prin.), PhD (Princeton), Director, Centre for Foreign Policy Studies. Global developments; African and Asian political economy and foreign policy; human security  
Smith, J., BA (McMaster), MA, PhD (Dal). Canadian government and politics; American government; Modern liberal theory  
Stairs, D.W., BA (Dal), MA (Oxon), PhD (Toronto), FRSC. 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

## Associate Professor

Black, D., BA (Trent), MA, PhD (Dal). Canadian & comparative foreign policy; Southern Africa; North-South relations  
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

## Assistant Professors

Carbert, L., BA (Alta), MA, PhD (York). Political theory; Canadian political behaviour; feminist theory

## Adjunct Professors

Hayden, P., Centre for Foreign Policy Studies  
Heard, A., Simon Fraser University  
Pyrzcz, G., Acadia University  
Sutherland, S., Independent Scholar

## I. Admission Requirements

Applicants must satisfy the minimum requirements set by the Faculty of Graduate Studies.

Successful applicants for the MA programme 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 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 programme 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 programme, but PhD students are admitted only when a faculty member is prepared to supervise the applicant's programme, 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 programmes, but may be required to satisfy additional requirements within the programme. 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 Programmes

### A. Master of Arts (MA)

The MA is a one-year (12 month) programme 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 programme 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. Classes Offered

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 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 each 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.

INSTRUCTORS: P. Aucoin and D. Cameron

FORMAT: Seminar 2 hours

### **Cross-listed Classes:**

#### **\*POLI 5205.03: Canadian Political Thought.**

The class examines enduring controversies in Canadian politics. Examples include: the nature of Canadian federalism; partisanship and party government; parliamentary versus republican institutions; religion and politics. These controversies are examined as they have been articulated in speeches, pamphlets and articles by people active in public life. Approved with Canadian Studies.

INSTRUCTOR: J. Smith

FORMAT: Seminar 2 hours

PREREQUISITE: POLI 2200.06

CROSS-LISTING: POLI 3205.03

#### **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.

INSTRUCTOR: J. Smith

FORMAT: Seminar 2 hours

PREREQUISITE: POLI 2200.06

CROSS-LISTING: POLI 3206.03

#### **\*POLI 5216.03: City Government in Canada.**

The unique character of council government is examined in terms of its historical evolution and present structure and operation. Special attention is given to the government of cities and to recent reforms at the metropolitan level. Approved with Canadian Studies.

INSTRUCTOR: D. Cameron

FORMAT: Lecture and discussion 2 hours

PREREQUISITE: POLI 2200.06 or equivalent

CROSS-LISTING: POLI 3216.03, PUAD 6400.03

#### **\*POLI 5220.03: Intergovernmental Relations in Canada.**

The territorial division of political power and the relations that have developed between governments are considered, with emphasis on the impact on policy outcomes.

INSTRUCTOR: H. Bakvis

FORMAT: Seminar 2 hours

PREREQUISITE: POLI 2200.06 or instructor's permission

CROSS-LISTING: POLI 3220.03, PUAD 6750.03

#### **\*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.

INSTRUCTOR: H. Bakvis

FORMAT: Lecture and discussion 2 hours

PREREQUISITE: POLI 2200.06 or instructor's permission. Students will find it helpful to have some background in statistics or methodology, such as POLI 3494.06

CROSS-LISTING: POLI 3224.03

#### **\*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 programmes. It will explore the ways in which their structures and behaviour 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

PREREQUISITE: POLI 2200.06 or instructor's permission

CROSS-LISTING: POLI 3228.03, PUAD 6505.03

#### **\*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.

INSTRUCTOR: R. Finbow

FORMAT: Seminar 2 hours

PREREQUISITE: Open to graduate students and senior

undergraduates, who have completed classes in Canadian politics or economic history, or by permission of the instructor

CROSS-LISTING: POLI 3233.03

### **\*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.

INSTRUCTOR: R. Finbow

FORMAT: Seminar 2 hours

PREREQUISITE: Open to graduate students and senior undergraduates, who have completed classes on Canadian politics, or permission of the instructor

CROSS-LISTING: POLI 3235.03

### **\*POLI 5240.03: Policy Formation in Canada.**

A comprehensive examination of the three critical questions in the study of policy formation in Canada: 1) the function of the state; 2) the question of why governments develop policies; and 3) the means by which governments authoritatively develop policies. The discussion links these variables with a macro level analysis of the scholarly approach to decision-making. The emergence of tension resulting from the development of superindustrial society and from regionalism in the Canadian community provides policy problems on which the general theoretical analysis is hinged.

INSTRUCTOR: P. Brown

FORMAT: Seminar 2 hours

PREREQUISITE: Open to Honours students in their fourth year and to graduate students

CROSS-LISTING: POLI 3240.03, PUAD 5120.03

INSTRUCTOR: P. Brown

### **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

PREREQUISITE: POLI 4240.03 or instructor's permission

CROSS-LISTING: POLI 3241.03, PUAD 5121.03

### **POLI 5250.06: Canadian Public Administration.**

This class examines the organization and management of the executive-bureaucratic structures of government for the formation and management of public policy and public services. It considers the design and operation of the cabinet system and ministerial portfolios; relations between ministers and the career public service, policy and budgetary processes; and the structural designs of departments, agencies, crown corporations and regulatory commissions. A major focus will be the effects of the new public management on public administration, as governments in Canada, as elsewhere, seek to cope with budgetary restraints, increased demands for quality services and public participation, and greater effectiveness in securing results.

INSTRUCTOR: P. Aucoin

FORMAT: Lecture and discussion 2 hours

## **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.

INSTRUCTOR: R. Finbow

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.

INSTRUCTOR: T. Shaw

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

#### **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

PREREQUISITE: POLI 2300 or 2500 or instructor's permission

#### **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.

INSTRUCTOR: H. Bakvis

FORMAT: Seminar 2 hours

PREREQUISITE: POLI 2200.06 or POLI 2300.06 or instructor's permission

CROSS-LISTING: POLI 3304.03, PUAD 6755.03

#### **POLI 5311.03: Sport 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.

INSTRUCTOR: D. Black

FORMAT: Seminar 2 hours

**\*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  
 PREREQUISITE: POLI 2300.06 or equivalent or instructor's permission  
 CROSS-LISTING: POLI 5315.03

**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.

INSTRUCTOR: R. Boardman  
 FORMAT: Seminar

**POLI 5350.03: Governance and Globalization.**

This seminar class provides students with an opportunity for critical evaluation of the reshaping 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 centre 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 "internationalisation" 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.

INSTRUCTOR: S. MacLean  
 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.

INSTRUCTOR: R. Finbow  
 FORMAT: Seminar 2 hours

**POLI 5316.03: Politics in South Africa.**

This seminar class focuses on the politics of change and development in South Africa. It explores both comparative and distinctive features of the South African case. Comparatively, we consider, for example, settler colonialism, ethnic and racial cleavages and conflicts, the politics of resistance and "liberation", the challenges of democratic transitions, and the demands of balancing growth and redistribution. Distinctively, we study the origins and effects of South Africa's extraordinary variant of racialist rule, apartheid, and the "negotiated revolution" by which it was transcended.

FORMAT: Seminar 2 hours

**\*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. There is considerable emphasis on formal and informal political institutions, especially political parties and elections.

INSTRUCTOR: J. Smith  
 FORMAT: Seminar 2 hours  
 PREREQUISITE: POLI 2200.06 or POLI 2300.06 or instructor's consent  
 CROSS-LISTING: POLI 3379.03

**C. Political Theory and Methodology****Core Graduate Seminar:****POLI 5400.03: Advanced Seminar in Political Theory.**

A survey of current debates within the discipline of political theory, this class will examine philosophical controversies within discussions of democracy, nationalism, liberalism, feminism, communitarianism, and other political issues. It will also address philosophical debates within contemporary approaches to political science, and may examine topics in the history of political thought.

INSTRUCTOR: K. Fierlbeck  
 FORMAT: Seminar 2 hours

**POLI 5401.03: Contemporary Political Thought: Confronting the new Millennium.**

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 distributive 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.

INSTRUCTOR: K. Fierlbeck  
 FORMAT: Lecture/seminar

**Cross-Listed Classes:****POLI 5431.03: Politics Through Film and Literature.**

Film and literature often capture the depth and texture of politics in a way that the social scientific method cannot. This class uses contemporary novels and films to analyze the Enlightenment, Orientalism, the frontier, and the political economy of community. After having looked at how the study of literature both complements and supplements the social scientific approach to understanding politics, the seminar will analyze the implicit and explicit treatment of a number of political themes in a list of works by both modern and classical novelists and playwrights ranging from Sophocles, Shakespeare and Dickens to Brecht, Sartre and Naipaul.

INSTRUCTOR: L. Carbert  
 FORMAT: Seminar 2 hours

**\*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.

INSTRUCTOR: K. Fierlbeck  
 FORMAT: Seminar 2 hours

**\*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

PREREQUISITE: Normally, classes in philosophy or political science or economics: consult instructor

CROSS-LISTING: PHIL 4470.03/5470.03, 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.

INSTRUCTOR: G. Winham

FORMAT: Seminar 2 hours

### Cross-listed Classes:

#### **\*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 multinational communications.

INSTRUCTOR: F. Harvey

FORMAT: Seminar 2 hours

#### **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.

INSTRUCTOR:

FORMAT: Seminar 2 hours

PREREQUISITE: Class in international politics or instructor's permission

CROSS-LISTING: POLI 3351.03

#### **\*POLI 5535.03: The New International Division of Labour.**

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 Labour/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.

INSTRUCTOR: T. Shaw

FORMAT: Seminar 2 hours

PREREQUISITE: Class in international politics or instructor's permission

CROSS-LISTING: POLI 3535.03

#### **\*POLI 5537.06: Management and Conservation of Marine Resources.**

This is an intensive programme on the problems of managing the multiple uses of the Exclusive Economic Zone. It covers the New Law of the Sea and its many implications for politics and management, the social, economic and technical aspects of managing living resources, non-living resources, shipping, ports and harbours, coastal management and the protection of the environment; national legislation and required institutional infrastructure, regional cooperation and cooperation with international institutions.

INSTRUCTOR: E.M. Borgese

FORMAT: Seminar 2 hours

PREREQUISITE: Class in international politics or instructor's permission. Offered as a summer class only; consult instructor

#### **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 Labour 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 programmes 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

#### **POLI 5550.03: Japanese Foreign Policy.**

This class focuses on the class of Japan's foreign policy since 1945, and the factors that have shaped its approaches to regional and international issues. Topics are studied in the contexts of Japanese history, cultural traditions, its economy, and domestic politics.

INSTRUCTOR: R. Boardman

FORMAT: Seminar 2 hours

#### **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.

INSTRUCTOR: D. Stairs

FORMAT: Seminar 2 hours

#### **POLI 5571X/Y.06: Strategy and Canadian Defence Policy.**

This seminar examines post-World War II Canadian defence 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. defence relations; defence 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.

INSTRUCTOR: D. Middlemiss

FORMAT: Seminar 2 hours

**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

**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.  
INSTRUCTOR: D. Middlemiss  
FORMAT: Seminar 2 hours

**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).  
INSTRUCTOR: D. Middlemiss  
FORMAT: Seminar 2 hours

**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 Sea or GATT negotiations. Students are expected to participate in a simulation exercise and to prepare a term paper or selected case of international negotiation.  
INSTRUCTOR: G. Winham  
FORMAT: Seminar 2 hours

**POLI 5585.03: Politics of the Environment.**

Environmental issues have become increasingly important on international agendas. In this class, political analysis of these questions is grounded in a global ecological perspective. The topics for discussion include acid rain and other problems in the relations between advanced industrialized countries; the role of international institutions and international law in promoting environmental conservation; the environment dimension of international development; and the politics of the transnational environmental movement.  
INSTRUCTOR: R. Boardman  
FORMAT: Seminar 2 hours  
PREREQUISITE: A class in international politics or foreign policy, or instructor's permission  
CROSS-LISTING: POLI 3585.03

**\*POLI 5589.03: The Politics of the Sea.**

The major issues involved in the Law of the Sea, the differing interests of different countries, the developing legal framework, and the political process of the ongoing negotiations are covered.  
FORMAT: Seminar 2 hours

PREREQUISITE: Preference is given to graduate students, although mature students from other relevant disciplines are welcome.  
CROSS-LISTING: POLI 3589.03

**\*POLI 5595.03: Politics of the Sea II: Ocean Governance.**

**\*POLI 5596.06: Theories of War and Peace.**

This class examines critically a broad range of theories of the causes, persistence, and termination of war.  
INSTRUCTOR: F. Harvey  
FORMAT: Seminar 2 hours  
PREREQUISITE: Class in international politics or instructor's permission  
CROSS-LISTING: POLI 3596.03

**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.  
INSTRUCTOR: D. Stairs  
FORMAT: Seminar  
CROSS-LISTING: POLI 3636.03

**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.**

# Psychology

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Location: Life Sciences Centre  
1355 Oxford Street  
Halifax, NS B3H 4J1  
Telephone: (902) 494-3417  
Fax: (902) 494-6585  
Website: www.dal.ca/Psychology

## Chairperson of Department

Moore, C. L.

## Graduate Coordinator

Klein, R.M.

## Professor Emeritus

Honig, W.K., BA (Swarthmore), PhD (Duke). Cognition and memory in animals.

## Professors

- Barresi, J., PhD (Wisconsin). Personology, social cognition, philosophical psychology, history of psychology.
- Brown, R.E., BSc (Victoria), MA, PhD (Dal). Behavioural endocrinology, developmental psychobiology, drugs and behaviour.
- Camfield, C., BS, MD (Michigan), Major appointment in Pediatrics. Pediatric epilepsy and mental handicap, psychosocial-quality of life issues in children with chronic health problems.
- Connolly, J.F., AB (Holy Cross), MA (Sask), PhD (London). Cognitive and clinical neuroscience, language, memory, stroke, event-related brain potentials, magnetoencephalography, fMRI
- Dunham, P.J., BA (DePauw), MA, PhD (Missouri). Infant cognitive behaviour.
- Klein, R.M., BA (SUNY), MA, PhD (Oregon), Faculty of Science Killam Professor in Psychology, Graduate Programme Coordinator. Human attention and information processing, oculomotor control, cognitive neuroscience.
- Kopala, L., BSc (Alberta), MD (Calgary), Major appointment in Psychiatry. Schizophrenia, olfaction, psychopharmacology, early intervention and treatment of psychosis, brain imaging, neurocognition.
- Kutcher, S., BA, MA, MD (McMaster), Major appointment in Psychiatry. Adolescent development, depression, psychopharmacology.
- LoLordo, V.M., AB (Brown), PhD (Penn). Learning, animal behaviour.
- Lyons, R., BA (Dal), MEd (StFX), PhD (Oregon), Director, Atlantic Health Promotion Research Centre, Major appointment in the School of Health and Human Performance. Health promotion, health psychology, personal relationships, coping.
- McGrath, P., BA, MA (Sask), PhD (Queen's). Pediatric psychology, pain, child psychopathology.
- Meinertzhagen, I.A., BSc (Aberdeen), PhD, DSc (St. Andrews), Killam Professor in Neuroscience and Director, Neuroscience Institute. Development neurobiology of invertebrates.
- Mitchell, D.E., BSc, MAsc (Melb), PhD (Berkeley). Visual system development, visual perception.
- Moore, C.L., BA, PhD (Cantab). Early development of social understanding.
- Phillips, D.P., BSc, PhD (Monash). Sensory processes in hearing, central auditory neurophysiology.
- Robertson, H., MSc (Western), PhD (Cantab), Major appointment in Pharmacology. Molecular neurobiology, gene expression in brain kindling and long-term changes in brain, Parkinson's disease, Huntington's disease, stroke.

- Rusak, B., BA (Toronto), PhD (Berkeley), 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.
- Shaw, S.R., BSc (London), PhD (St. Andrews). Sensory neurobiology, neural evolution and plasticity.
- Yoon, M.G., BS (Seoul), PhD (Berkeley). Development of nervous systems and language.

## Associate Professors

- Adamo, S., BSc (Toronto), PhD (McGill). Insect behavioural neuroscience, cephalopod behaviour, invertebrate behavioural physiology.
- Earhard, B., BA, MA, PhD (Toronto). Analytic operations in perception.
- Finley, G.A., BSc, MD (Dal), Major appointment in Anaesthesia. Pediatric pain (measurement and management), audible alarm signals, perioperative anxiety, awareness and memory.
- McGlone, J., BA, MA, PhD (UWO). Clinical neuropsychology, outcomes of cardiac surgery, vagal nerve stimulation, temporal lobe resection, multiple chemical sensitivities.
- McMullen, P., BSc, MSc (Toronto), PhD (Waterloo). Visual cognition, cognitive neuropsychology.
- Moore, B.R., AB (Emory), PhD (Stanford). Imitative learning in birds, conditioning, the evolution of learning.
- Ozier, M., BA, MA, PhD (Toronto). Memory, mood.
- Santor, D., BA (Western), PhD (McGill). Depression, vulnerability factors, psychometrics, adolescent mental health.
- Stewart, S., BSc (Dal), PhD (McGill). Anxiety, substance abuse, cognitive psychophysiology.
- Sullivan, M.J.L., MA, PhD (Concordia), Clinical PhD Programme Coordinator. Psychology of pain and disability.

## Assistant Professors

- Kalynchuk, L.E., BSc (Alberta), MA, PhD (UBC). Affective neuroscience, temporal lobe epilepsy, behavioural and molecular effects of stress, receptor pharmacology.
- Khan, S.B., BA, MA (Western), PhD (Toronto), Major appointment in Psychiatry. Adolescent depression, bipolar disorder, neuroimaging, cognitive functioning.
- Porter, S.B., BSc (Acadia), MA, PhD (UBC). Forensic psychology, memory distortion/deception, psychopathy.
- Smith, I., BA (Dal), MSc (Brown), PhD (Dal), Major appointment in Pediatrics/Dalhousie. Developmental disabilities, autism, perceptual and cognitive development.
- Taylor-Helmick, T.L., BA (Calgary), MSc, PhD (Dal). Cognition, cognitive neuroscience, attention, motor control: gating of voluntary and reflexive control of orienting, inhibition of attention and motor production.
- Waschbusch, D.A., BSc, MSc (Wisconsin), PhD (Pittsburgh). Developmental psychopathology, ADHD, antisocial behaviour, peer relationships.

## Senior Instructors

- Hoffman, R.S., BA (Col Coll), MA (Dal). Computer technology, experimental methods.
- Leary, J., BSc (Dal), MSc (MUN), PhD (Adelaide). Information processing, vision.
- Schellinck, H., BSc, MSc, PhD (Dal). Learning, memory and olfaction.

## Adjunct Professors

- Backman, J., MA, PhD (Carleton), Psychology/IWK Grace Health Centre. Learning disabilities, neuropsychology and reading.
- Catano, V.M., BSc (Drexel), MSc, PhD (Lehigh), Psychology/Saint Mary's. Industrial/organizational psychology, assessment of work behaviour, psychology of trade unions.
- Clark, J.W., BA, MA (McGill), PhD (Queen's), Psychology/Dalhousie. History of psychology, comparative.
- Cohen, A.J., BA (McGill), MA, PhD (Queen's), Psychology/UPEI. Music cognition, audio-visual integration, film music perception.
- Corkum, V., BSc (Dal), MA (UNB), PhD (Dal), Colchester Regional Hospital and Bedford Psychological Services. Typical child development, disorders of development, children and family education and intervention.

Davidson, K., BA (Queen's), MAsC, PhD (Waterloo), Mount Sinai School of Medicine. Behavioural medicine, personality, gender differences.

Ellsworth, C., MA, PhD (Queen's), Psychology/IWK Grace Health Centre. Neurodevelopmental disorders (infants and preschoolers), early identification, parent education and support.

Eskes, G.A., BA, PhD (Berkeley), Psychology/QEII Health Sciences Centre. Neuropsychology, memory, neglect, reading disorders, aging, stroke, cognitive remediation, depression.

Farmer, M., BSc (MSVU), MSc, PhD (Dal), Psychology/IWK Grace Health Centre. Dyslexia, learning disabilities, developmental disorders, behaviour management.

Fentress, J.C., BA (Amherst), PhD (Cantab), Psychology/Dalhousie. Ethology and behavioural neuroscience.

Fisk, J., BSc, MA, PhD (Western), Psychology/QEII Health Sciences Centre. Neuropsychology, motor control, neurodegenerative disorders, aging, assessment instrument development.

Harvey-Clark, C., BSc (Victoria), DVM (Western College of Vet. Medicine), University Director of Animal Care. Applied ethology, pain.

Kiss, I., BSc (Toronto), MA, PhD (Concordia), Mental Health Services, The Nova Scotia Hospital. Clinical neuropsychology, cognitive psychophysiology, memory, executive function.

MacDonald, G.W., BA (StFX), MA, PhD (Windsor). Learning disabilities, developmental reading disorders, pediatric neuropsychology.

McCormick, P.A., BSc (Dal), MA, PhD (Waterloo), Psychology/StFX. Visual cognition, attention, perception, memory.

McLeod, P., BSc (MtA), MSc (MUN), PhD (Dal), Psychology/Acadia. Social and cognitive development, perceptions of control, physiology and behaviour of wild canids.

Nakajima, S., BA (China), MA (Wash), PhD (McGill), Shouin College, Japan. Physiological psychology.

O'Neill, P., MSc, PhD (Yale), Psychology/Acadia. Ethical decision making, community psychology.

Potter, S.M., BSc (Victoria), PhD (McGill), Psychology/Acadia. Behavioural teratology, effects of fetal exposure to alcohol, tobacco and other substances, infant information processing, cognitive processes among psychopaths.

Rodger, R.S., MA (Edin), PhD (Queen's, Belfast), Department of Fisheries and Oceans. Statistical theory.

Schwartz, M., BSc (McGill), MA, PhD (Waterloo), Research - Resource Officer/QEII Health Sciences Centre. Left-handedness and hemispheric specialization.

Symons, D., BSc (McMaster), MA, PhD (Western), Psychology/Acadia. Early social development, child-clinical and family psychology, behavioural assessment, attachment and relationships, parenting, theory of mind.

Symons, S., BSc (Dal), MA, PhD (Western), Psychology/Acadia. Literacy development, educational psychology, learning disabilities.

### Research Associates

Frohlich, A., Diplom, Dr. rer. Nat. (Freie Universität Berlin), MSVU  
 Pyza, E., PhD (Jagiellonian Univ), Inst. of Zoology, Jagiellonian Univ.  
 Trappenberg, T., MSc, PhD (RWTH Aachen), Exp. Psychology Unit, Oxford Univ., England

### Postdoctoral Fellows

Borycz, J., PhD (Polish Academy of Sciences)  
 Collin, C., PhD (McGill)  
 Dong, Y.-N., PhD (Beijing Medical University)  
 Fabian-Fine, R., PhD (Frankfurt), Killam Fellow  
 Houlihan, M., PhD (Univ. of Ottawa)  
 Marchand, Y., PhD (Univ. of Compiègne, France)  
 Marchant, E., PhD (Simon Fraser Univ.)  
 Polyakovskiy, A., PhD (Soviet Academy of Sciences)  
 Song, X., PhD (Univ. of New England, Australia)  
 Thankachan, S., PhD (Hamdard Univ, New Delhi, India)  
 Xu, W., PhD (La Trobe Univ.)

## 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 programmes must submit at least two letters of reference, official copies of all undergraduate and graduate transcripts, GRE scores 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 Programme must submit an additional reference letter which focuses on their clinical experience and/or suitability for work in clinical psychology.

## II. Degree Programmes

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 programmes. The Department does not have a "terminal" Master's programme nor does it offer a Master's degree in Clinical Psychology.

### A. Psychology (Experimental)

The graduate programmes in Psychology emphasize training for research. They are best described as "apprenticeship" programmes in which students work closely with a faculty member who has agreed to supervise the student's research. Compared with many other graduate programmes, 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 programme, 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 programme. The minimum amount of teaching is 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 programme, students in the PhD programme must complete the following classes (unless they were completed as part of the Master's programme):

- 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)

During each year in the PhD programme 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 programme (see Master's programme 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 programmes in Psychology/Neuroscience are coordinated by the Psychology Department and an interdisciplinary Neuroscience Programme Committee with representation from the Departments of Anatomy and Neurobiology, Biochemistry, Pharmacology, Physiology and Biophysics, and Psychology (see Neuroscience calendar entry). They are also designed as "apprenticeship" programmes 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 programme, 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 programme. The minimum amount of teaching is 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 Programme 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 programme, students in the PhD programme must complete the following classes (unless they were completed as part of the Master's programme):

- 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 programme 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 programme (see Masters programme description). The Neuroscience and Psychology Graduate Programme 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 programme in Clinical Psychology is cooperatively administered by the Psychology Department and the Clinical Programme 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 an APA/CPA accredited, structured, five-year programme 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 programme, 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 are placed in a full-year clinical internship. The Department does not offer a Master's degree in the Clinical PhD programme, 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 ½ credit class in the quantitative/analytic area.
- PSYO 6201.03: Psychological Assessment: Child
- PSYO 6202.03: Psychological Assessment: Adult
- PSYO 6205X/Y.06: Interviewing and Intervention
- PSYO 6215X/Y.06: Psychopathology and Treatment
- PSYO 6220X/Y.06: Seminar: Advanced Clinical Intervention
- PSYO 6800.03: Clinical Neuropsychology
- PSYO 7100.03: Seminar in Teaching Effectiveness
- PSYO 7500X/Y.06: Proseminar: Methods of Psychological Inquiry
- PSYO 8005.03: Research Seminar
- PSYO 8201.03: Ethics and Professional Decision-Making
- At least two credits of elective seminars must also be completed.

Students in year one of the programme are required to register for PSYO 5000X/Y.06 (Assignment Research). During each subsequent year in the PhD programme students are required to register for Dissertation Research (PSYO 9530.00). During each residency year students must register for and attend the weekly colloquium series (PSYO 8000X/Y.06), Clinical Rounds/Case Conference (PSYO 8010X/Y.06) and do some teaching in the undergraduate programme. The minimum amount of teaching is 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.

## III. Classes Offered

Required classes are offered on a regular basis. Other classes are offered, and seminar topics chosen, on the basis of faculty interests and student needs.

### 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.

### **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.

INSTRUCTOR: D. Santor

### **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 behaviours that may be produced in the context of these events. These correlations will be studied within the auditory, visual and tactile modalities.

INSTRUCTOR: D.E. Mitchell, D. Phillips

### **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 behaviour. 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: Physiological Psychology.**

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 behaviour, and biological rhythms, will be covered in different years.

### **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: J. Barresi

### **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: C. Moore

### **PSYO 6160.03: Comparative Psychology.**

Different topics in comparative psychology (such as kin selection, parental behaviour, hormonal control of behaviour, olfaction and behaviour) 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, behaviour 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.

### **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. Stewart

### **PSYO 6205X/Y.06: Interviewing and Intervention.**

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 and dimensional classification systems (e.g. Achenbach's Child Behaviour Profiles) will also be examined.

INSTRUCTOR: D. Santor

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 6211.03: Topics in Assessments.**

Different topics in assessment are covered in a seminar format.

### **PSYO 6215X/Y.06: Psychopathology and Treatment.**

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 class is to familiarize students, from an empirical perspective, with the applications as well as limitations of different intervention modalities.

INSTRUCTORS: J. Connolly, D. Waschbusch

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 6218.03: Topics in Psychopharmacology.**

This 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.

INSTRUCTORS: R. Brown, S. Stewart

### **PSYO 6220X/Y.06: Advanced Clinical Intervention.**

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: M. Sullivan

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 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.

INSTRUCTORS: V.M. LoLordo, B. Moore

**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.

INSTRUCTORS: R. Klein, P. McMullen, B. Earhard

**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. Porter

**PSYO 6410.03: Topics in Therapeutic Intervention.**

This seminar 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 behaviour therapy, individual psychotherapy, pharmacotherapy, etc.

**PSYO 6420.03: Topics in Health Psychology.**

This seminar 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.

**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: 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: P. Dunham

**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 behaviour (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.

INSTRUCTOR: R. Klein, Coordinator

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 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: P. McGrath

**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.

INSTRUCTOR: M. Sullivan

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 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 behaviour 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.

**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 Programme 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.

### **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: M. Sullivan, Coordinator of Clinical Programme

### **PSYO 9530.00: PhD Thesis.**

## **Public Administration**

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Location: 6152 Coburg Road, Sixth Floor  
Halifax, NS B3H 3J5  
Telephone: (902) 494-3742  
Fax: (902) 494-7023  
E-mail: DalMPA@is.dal.ca  
Website: <http://www.mgmt.dal.ca/spa/>

### **Director of School**

Bakvis, H.

### **Graduate Co-ordinator**

McNiven, J.D.

### **Professors**

Aucoin, P., BA (SMU), MA (Dal), PhD (Queen's), jointly with Political Science. Government organization, public management reform

Bakvis, H., BA (Qu), MA (UBC), PhD (UBC), jointly with Political Science. Intergovernmental relations, government structure and organization, political parties and interest groups, and electoral 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

McNiven, J.D., MA, PhD (Michigan), jointly with Business Administration. Business/government relations and economic development policy

Poel, D.H., BA (Calvin), MA (W Mich), PhD (Iowa). Programme evaluation and policy analysis, accountability and governance

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)

### **Assistant Professor**

Cassin, A.M., BA (Man), MA (UBC), PhD, (Toronto). Public sector management, gender relations, career advancement, community economic development

### **Adjunct Professors**

Chaytor, K., BA (Mt. St. Vincent), MA, PhD (Dal)

Durier-Copp, M., BA, MA, PhD (McGill)

Fanjoy, E., BSc (Hons) (UNB), LL.D (UNB)

Fullerton, R.W., BSc (Dal), MEd (Toronto), PhD (Union Institute)

Gilbert, M., BSc (SMU), MBA (Dal), PhD (Brad)

Lopes, B., BA (SMU)

Pross, A.P., BA, MA (Queen's), PhD (Toronto)

Regan, T., BA (Toronto), MA, PhD (Duke) (Sociology, Acadia University)

### **Special Lecturers**

Kilfoil, M.A., BBA (St FX), BA (SMU), MA (Carleton), PhD (Dal)

Scott, E., BComm (Dal), MBA (Col), CA, CMA

Students seeking further information or help in planning classes of study in the School of Public Administration should address themselves to:

Graduate Co-ordinator  
School of Public Administration  
6152 Coburg Road  
Halifax, NS B3H 3J5  
Telephone: (902) 494-3742  
Fax: (902) 494-7023

## I. Degree Programmes

The graduate programmes 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 programme that links public administration to business, the environment and the information sciences.

The programmes 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 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).

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 programme. 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, personnel and statistical techniques on the one hand, and economic, organizational and policy analysis on the other. The Graduate Diploma programme and the first year of the two year MPA programme require students to complete classes in these basic fields.

Students in the second year will propose their programme 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. Students must discuss with and have their programme approved by the graduate coordinator. The second year of the MPA programme offers the student the opportunity to select one of the following concentrations:

- (a) Public policy
- (b) Public management.

Each student, at the start of the second year of studies (or the equivalent for part-time studies), may declare one of the above as an area of concentration. A minimum of six (including projects and directed readings, if any) of the nine elective classes will be selected from the area of concentration. The other three classes, designated as free standing, may be selected from elsewhere. These include classes from the other areas of concentration, cross-listed classes taught by non-SPA members, and classes from other academic units at Dalhousie or other universities provided they have some public sector content. The offerings of related programmes and disciplines, such as business administration, economics, health services administration, law, planning, political science, sociology, and social work can be used by students subject to the approval of the Graduate Co-ordinator. Students who receive some advanced standing exemptions on the basis of their previous class work will take at least two-thirds of the elective classes from their area of concentration.

A one-year MPA, consisting of five full credits of class work, may be considered for students who have completed, with a first-class standing, a BA honours degree in public administration, political science or economics. 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 programme must have included at least three of the five class credits required in the first year of the two-year MPA programme.

Students in the one-year MPA programme will select their area of concentration at the start of the programme and may take up to one elective class, from outside the area of concentration.

The School and the Faculty of Law offer a joint LLB/MPA programme. The programme 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 programme 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 MPA/LLB programme. The closing date for applications for the LLB is the end of February.

Students in the LLB/MPA programme will be eligible to take up to one of the five elective classes from outside the area of concentration. The Senior Seminar: Ethics, Public Service, and Governance (PUAD 6000.03) class is not a required class for LLB/MPA students, but may be taken as an elective class.

## II. Application Procedures

Application forms are available from the Admissions Office of Dalhousie University. Applications should be submitted as early as possible and not later than June 1 in the academic year in which studies are to commence.

### A. General Admission Requirement for GDPA and MPA

Enrollment in the School is limited. In general, competitive applicants will have attained a good second class standing (B+ average) in their previous university work.

Admission is based on an assessment of:

- Professional experience and/or promise;
- All previous academic work;
- Letters of reference;
- TOEFL for foreign students (Test of English as a Foreign Language), 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;

Therefore, 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 letters of reference (one of which should be academic);
- A TOEFL score (if applicable)

Students may submit a score from the Graduate Management Admission Test (GMAT) in support of their application. In the case of North American candidates, applications for the test are accepted by the ETS in Princeton until approximately six weeks before test dates. For candidates in other countries, closing dates are eight weeks before test dates.

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.

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 as a requirement for admission. (See section 2 of this calendar.)

For further information, contact the Administrative Secretary of the School.

## B. Part-time Study

The programmes 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 during the 12 months, September to August.

In order to ensure that graduate students benefit from a reasonable concentration of their studies, part-time programmes leading to the GDPA must be completed within four years, and part-time programmes leading to the MPA must be completed within six years.

## III. Degree Programmes

### A. Graduate Diploma in Public Administration (GDPA)

The Graduate Diploma in Public Administration is a one-year graduate programme 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 five credits:

- PUAD 5100.03: Organizational Designs for Governance and Public Management
- PUAD 5120.03: Introduction to Public Policy
- PUAD 5125X/Y.06: Introduction to Policy Analysis and Applied Research Methods
- 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 5160.03: Public Sector Human Resources Management
- PUAD 5170.03: Professional Development, Communication and Leadership

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 a graduate programme designed for individuals prepared to undertake advanced professional study. Individual programmes 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 13 classes, which must include:

- PUAD 5100.03: Organization Designs for Governance and Public Management
- PUAD 5120.03: Introduction to Public Policy
- PUAD 5125X/Y.06: Introduction to Policy Analysis and Applied Research Methods
- 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 5151.03: Public Sector Accounting II
- PUAD 5160.03: Public Sector Human Resources Management
- PUAD 5170.03: Professional Development, Communication and Leadership
- PUAD 6000.03: Ethics, Public Service and Governance
- PUAD 6555.03: E-Government and Information Technology for the Public Sector

- PUAD 6525X/Y.06: MPA Practicum in Policy Analysis and Public Sector Management

The remaining credits will be electives, depending primarily on the student's area of concentration. Some advanced placement, resulting in a reduction of up to two and a half full-credits, may be granted to well qualified candidates.

The one-year MPA will require the successful completion of five credits, including up to two credits from the 5000-level classes, the Senior Seminar: Ethics, Public Service and Governance (6000.03), and at least two and a half elective credits.

### C. MPA (Management)

In July 1997, the School received Senate approval for an MPA (Management) degree. The MPA (Management) is a distance education, 16 credit graduate professional management degree for public sector executives wanting to improve the quality of their management performance today and maximize their prospects for career advancement in the 21st century.

The MPA (Management) will develop the following competencies in managers:

- Greater substantive knowledge of critical current issues in management/organizational design/policy;
- Analytical and problem-solving competencies for strategic change management;
- Leadership skills, in terms of interpersonal relations, building and using teams, effective verbal and written communications, and public service professionalism;
- Critical capacities for assessing best practices in comparative public/private sector contexts;
- Ability to manage financial resources optimally;
- Ability to manage people effectively;
- Ability to communicate and negotiate effectively both internally and externally;
- Ability to manage information;
- Sharpened ethical sensitivities.

Applicants will normally have a solid undergraduate degree with at least a B average. However, applicants who lack formal university training but have 10 years or more management experience and an appropriate professional certification or designation may still apply and be admitted if a Prior Learning Assessment (PLA) establishes that the combination of their work experience and professional designation or certification provides B standing equivalency.

The MPA (Management) will feature a number of off-campus delivery modes, including the Internet. Each class will conclude with an on-campus 2-day intensive classroom session.

For further information, contact the Coordinator, MPA (Management).

### D. The LLB/MPA Programme

The combined LLB/MPA programme is a four-year programme which enables students to select classes leading to degrees of Master of Public Administration and Bachelor of Laws. The suggested order of the programme is:

Year 1

- First year classes of the MPA programme

Year 2

- First year classes of the LLB programme

Year 3

- One and a half credits from the MPA programme
- Civil Procedure
- Constitutional Law
- 16 hours of classes from the LLB programme.

Year 4

- One credit from the MPA programme
- A minimum of 23 hours of classes from the LLB programme, which must include The Legal Profession and Professional Responsibility.

Candidates for the LLB/MPA programme must satisfy the entrance requirements of both programmes, and may obtain further information about the combined programme 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 programme may submit LSAT results in lieu of GMAT results.

#### **Advanced Standing**

Advanced Standing of up to five credits (one year) may be granted to students who have completed graduate level classes which are relevant to the Masters in Public Administration Programme but which have not been used towards another degree. Students are advised to seek advanced standing when they apply for admission.

#### **The Internship Programme**

The internship provides for formal integration of practical public service experience with academic studies in the MPA programme. 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.

### **IV. Classes Offered**

#### **PUAD 5100.03: Organizational Designs for Governance and Public Management.**

This class examines the organization 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 public-service institutions of government; the organization and roles of the central executive and corporate policy and management agencies; and, 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: P. Aucoin

#### **PUAD 5120.03: Introduction to Public Policy.**

This class examines policy-making theory and practice and considers 1) how important policy-making procedures are in determining eventual policy "outcomes" and 2) whether policy theory provides clear answers to what constitutes best practice for liberal democratic forms of government. The class begins by reviewing commonly held understandings or conventions about policy-making in the parliamentary system of government and then considers whether a case can be made for a dominant (or paradigmatic) view of the policy process and the extent to which any such view of policy making remains stable over long periods of time. Various empirical and normative characterizations of policy-making are then considered. Topics will be selected from the following list: institutionalism and neo-institutionalism, rational policy-making, incrementalism, mixed-scanning, systems analysis, various theories of interest group influence and control (pluralism, post-pluralism, liberal corporatism, constitutionalism), theories of bureaucratic control (coupled with theories of elite and class control), and finally, public choice theory. Each of these perspectives or models is considered in terms of its explanatory adequacy as well as its claim to normative status. The objectives of the class are: 1) to enable students to see that the policy-making process can be understood in different ways by employing different conceptual perspectives and to enable them to apply these perspectives in the analysis of policy problems; and 2) to demonstrate that methodological pluralism is not only characteristic of policy studies today, but a worthwhile way to

encourage both objectivity in the analysis of policy-making and creativity in the consideration of appropriate policy instruments for particular kinds of policy contexts. For the purpose of a seminar presentation and major assignment, students will be required to work with one or more of the conceptual perspectives considered in this class to assess a policy problem (selected from any level of government). A number of short papers on particular perspectives or models and/or response papers to class presentations will also be required. There is no final examination.

INSTRUCTOR: P. Brown

#### **PUAD 5125X/Y.06: Introduction to Policy Analysis and Applied Research Methods.**

This semester class brings together in one credit policy analysis and the research methods, which support the information gathering, analysis and reporting of policy analysis. The class will explore the processes of analyzing public policy problems and proposing options for their resolution. This will happen through a review and discussion of the current professional literature on policy analysis and the application of analytical and management skills to a policy analysis project.

The requirements of the policy analysis project will support by a study of the alternatives available in research design and data collection with attention to both qualitative and quantitative approaches to research.

INSTRUCTOR: D. Poel, M. Kilfoil

FORMAT: Seminar

#### **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: F. Siddiq

#### **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 course places a special emphasis on the role of the 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 in economics provide a unique blend of theoretical rigour, empirical relevance and sound policy applications.

INSTRUCTOR: F. Siddiq

#### **PUAD 5140.03: Quantitative Methods for Public Sector Management.**

This class will introduce students descriptive and inferential statistics as commonly used in public sector policy analysis, program evaluation and management. This will include an introduction to the analysis of contingency tables, comparison of means, correlation and regression. The class is designed for students with a variety of backgrounds, including those without prior preparation in statistics. The class uses SPSS software as a tool both for data management and analysis.

INSTRUCTOR: M. Kilfoil

#### **PUAD 5150.03: Public Sector Accounting.**

This class introduces students to the subject of accounting in governmental, non-profit 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: E. Scott

### **PUAD 5151.03: Public Sector Accounting II.**

This sequel to PUAD 5150 focuses upon financial management. Topics include: discounted cash flow analysis; valuation models; risk and rates of return; cost of capital; capital budgeting; long-term financing decisions; short-term financial management and financial analysis and planning. Further case applications of budgeting techniques and financial analysis are taken up in PUAD 6100. Please consult the instructor for information about assignments and other class requirements.

NOTE: PUAD 5150.03 or an equivalent accounting class approved by the instructor is a prerequisite for PUAD 5151.03.

INSTRUCTOR: E. Scott

### **PUAD 5170.03: Public Sector Human Resources.**

### **PUAD 5260.03: Professional Development, Communication and Leadership.**

### **PUAD 6000.03: Senior Seminar: Ethics, Public Service and Governance.**

One of the senior seminars and designed as a culminating and integrating exercise for the MPA programme, this class focuses upon a wide range of ethical problems. 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 programme, successful completion of the first year of studies is the prerequisite for this class.

INSTRUCTOR: P. Brown

## **Public Policy Concentration Classes**

### **PUAD 6010.03: Issues in Public Administration.**

This class offers students an opportunity to examine one or more currently salient issues in the field of public administration. For the 1996-97 academic year, the class focuses upon government restructuring, with the Nova Scotia government taken as a case study, but considered in the much broader context of government restructuring in certain of the western democracies in the 1990s. In the first few sessions the forces underlying restructuring will be examined with reference to specific conditions that are common to a number of these democracies; assigned readings will address both the causes and consequences of restructuring from various perspectives. Attention will also be given to restructuring initiatives in other Canadian provinces.

Against this background the Nova Scotia case will be considered. Detailed assessments of restructuring within particular government departments and government agencies will be provided together with some overarching assessments of the restructuring process. The latter will include an assessment of the significance of the budgetary and deficit crisis for the restructuring agenda; an assessment of selected evaluative techniques used by government departments in the pursuit of the restructuring agenda, and an assessment of what restructuring has meant for human resource management and for the morale of government employees. This class will involve expert presentations by several members of faculty and for certain topics senior government officials will be invited to join in the discussion that will follow each presentation.

Students will be required to prepare a number of short papers either in preparation for or as responses to particular presentations; a term paper on a topic associated with restructuring will also be required. For the term paper students will be encouraged to apply one or more techniques or theoretical perspectives acquired in one of the first year MPA classes to a topic covered in the class or to a closely related topic on government restructuring.

NOTE: For students enrolled in the two-year MPA programme, successful completion of the first year of studies is the prerequisite for this class.

### **PUAD 6100.03: Financial Administration and Budgeting.**

This class will provide participants with an opportunity to review the ways in which governments have tried to connect *what* they want to do with *what* they spend money for — i.e., the attempts to link planning, programming, budgeting and accountability. Recent developments at both the provincial and national levels of Canadian government will be used as case material; expenditure management systems, the development of “business plans” and lines of “business”, the use of alternative delivery systems, and the impact, generally, of new public management developments on notions of accountability. All will be considered.

INSTRUCTOR: D. Poel

### **PUAD 6235.03: Issues in Applied Economics.**

This class addresses a selection of topics in applied economics that are of considerable significance for an economy. It is designed for those students who wish to develop the ability to (a) understand and interpret different economic programmes 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; inflation and unemployment; stabilization policies; public sector economics; international trade and the balance of payments; labour markets and unions. 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: F. Siddiq

### **PUAD 6300.03: Alternative Program Delivery.**

Alternative Methods in Program Delivery is a graduate and honours 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 program 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 a methodology 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: P. Brown

### **PUAD 6400.03: Local Government.**

The unique character of council government is examined in terms of its historical evolution and present structure and operation. Special attention is given to the government of cities and to recent reforms at the metropolitan level.

INSTRUCTOR: D. Cameron

### **PUAD 6500.03: Business and Government.**

This class builds upon knowledge acquired in the first year of the MPA and MBA programmes. The aim is to explore the relationship between the worlds of business and government. The class begins by outlining the different logic and ethical codes of businesses and bureaucracies and then proceeds to examine the dynamics of interactions between the two sectors. Class topics are focused on the real world of business-government relationships. Assigned work includes a videotaped presentation on an appropriate topic. There is a final examination. Please consult the instructor for further details about class requirements.

INSTRUCTOR: J. McNiven

### **PUAD 6505.03: Interest Groups.**

This class undertakes a systematic examination of the functions and management of interest groups in Canada, and to a lesser extent, other western countries. It commences with a review of the role interest groups have played historically in Canadian politics and government and a discussion of the conceptual approaches that have been taken to interpret both the development of interest groups and their influence. These introductory sessions are intended to provide a framework for later seminars and for papers to be prepared by class members. The remaining sessions deal with the organization of particular interest groups and interest group associations and how they operate under conditions of consensus and conflict. The class is conducted on a lecture-seminar basis. Please see the instructor for information about assignments and other class requirements.

INSTRUCTOR: H. Bakvis

### **PUAD 6525X/Y.06: Practicum in Policy Analysis and Management.**

#### **PUAD 6537.03: Environmental Policy.**

Issues in Environmental Policy is a graduate and honours undergraduate level seminar which allows participants to conduct and present research on the major environmental issues of our day. In general terms, the class is concerned with what governments do and how they do it insofar as the environment is concerned. This entails an examination of both the instruments of governance, ranging from expenditures to regulation, including the use of economic instruments, and of the factors which govern the use of particular instruments. Class participants are encouraged to bring these concepts to bear in exploring the 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 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: P. Brown

#### **PUAD 6540.03: Canadian Regional Development Policy.**

#### **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.

#### **PUAD 6555.03: E-Government/Information Technology and Public Administration.**

#### **PUAD 6750.03: 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. Weekly readings as well as lectures and discussion in class will deal with the causes and the character of the division of power established by Confederation in 1867, and the evolution of that division through legal, financial and administrative decisions and arrangements. Also, the similarities and differences as between inter-provincial, and federal-municipal (including federal-provincial-municipal or "tri-level") relations will be examined. Specific topics will include the role of the courts in

constitutional interpretation, 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", as well as the 1982 constitutional changes and their implications for the future. In examining these topics, several themes will be explored, including the concepts of centralization and decentralization in Canadian federalism, the inter-relatedness of political and administrative structures with the division of power, and therefore intergovernmental relations, for policy outcomes.

The last of 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.

INSTRUCTOR: H. Bakvis

#### **PUAD 6755.03: Comparative Federalism.**

This is a seminar class which examines the theory, practice and administration of federalism within a comparative framework. Particular federations selected for discussion will depend in part upon the interests of students. In recent years, special attention has been given to the political, economic and administrative aspects of the European Union. Students will be expected to make a minimum of one class presentation as well as to prepare a term paper. There will be a final examination.

INSTRUCTOR: H. Bakvis

#### **PUAD 6785.03: Advanced Quantitative Methods.**

#### **Public Management Concentration Classes**

#### **PUAD 6100.03: Financial Administration and Budgeting.**

#### **PUAD 6110.03: Public Sector Auditing.**

#### **PUAD 6410.03: Municipal Management.**

The purpose of this class is to provide students with an enriched experience in understanding practical decision-making situations in the municipal arena. The assumption throughout is that class participants are headed for a Chief Administrative Officer (CAO) position in smaller municipalities or a middle management position in larger municipalities.

Accordingly, the emphasis is on small group dynamics. Students will be expected to deal with the substantial paper flow which accompanies senior management positions, including some theoretical literature. However, the central thrust will be on developing a capacity to meet the requirements of the senior management level, and to respond appropriately to financial, personnel and project problems. For additional information on assignments and other class requirements, please consult the instructor.

#### **PUAD 6420.03: Municipal Financial Administration.**

The student is introduced to the financial structure of municipal government, the assessment function and real property tax, the operating and capital budget, capital financing, global issues in municipal finance and municipal reform. The curriculum is presented in a non-technical manner and is intended to help the generalist better understand and respond to contemporary issues in municipal finance.

It would be desirable, but not essential, for students to have a basic understanding of the organization and operation of local government in Canada prior to enrolling in this class. For information on assignments and other class requirements please consult the instructor.

#### **PUAD 6520.03: Programme Evaluation Seminar.**

Approaches to programme evaluation have proliferated over the past thirty years. The early emphasis on experimental designs and quantitative methods has been expanded to include the full continuum of evaluative techniques, including both quantitative and qualitative research methods. The class introduces students to the

discipline of programme evaluation across this methodological spectrum. It focuses on the following topics: the epistemology of programme evaluation; issues in evaluation research design; implementation and utilization; evaluation in international development; and ethical issues in programme evaluation. Attention is also given to the development of programme evaluation within the federal government. Students who plan to take the second-term practicum (PUAD 6521B) will use the first term to initiate contact with a cooperating agency (or programme) which will become the basis of an evaluation design and assessment report. Students enrolled only for this seminar will select a topic from the literature and experience of programme evaluation as a basis for a seminar presentation. Please see the instructor for additional information about class assignments and other requirements.

INSTRUCTOR: D. Poel

### **PUAD 6550.03: The Design and Use of Projects.**

One of the major changes in public administration during the 1990's from the previous two decades is the reliance of the private and public sectors on contracting work. This is usually accomplished through the design and use of projects. This class will examine the nature of projects, project sources and initiation, issues identification, proposal preparation, design models, data collection, analysis, findings, funding, recommendations and reporting. Actual proposals will be developed, often in conjunction with private consulting companies. The class will prepare students to be confident with the preparation and completion of projects.

INSTRUCTOR: K. Sullivan

### **PUAD 6555.03: The Impact of Technology on Public Administrators.**

This class examines a multitude of technological advances as impacting on public administrators. Because technological innovation are developing at a rapid pace, it is impossible to present an up-to-date detailed description of this class. For example, technology that is too expensive in January for an organization may have a drastic drop in price by the next month so that it is now affordable for a medium size organization. Therefore, the class description must be fluid and general so that both the instructor and students have the latitude to change the topics being discussed and studied. For additional information about class requirements and assignments please consult the instructor.

INSTRUCTOR: K. Sullivan

### **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 behaviours 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 and write a major paper describing the organizations' values, assumptions, maturity and ability to change.

For information about class assignments and other requirements, please consult the instructor.

INSTRUCTOR: K. Sullivan

### **PUAD 6600.03: Public Personnel Administration.**

The principles and practices of personnel management are well established and clearly elaborated in public sector organizations. This class critically explores the technology of managing positions and employees in the public service. The technology of personnel management refers to the routine practices for organizing positions, employee selection, compensation and performance appraisal. Various methods of assembling organizational relations are explored. The management of employees is concerned with day-to-day managerial practices within work sites in public organizations. Issues related to merit, political neutrality, pay equity, affirmative action, career advancement, human resource planning and employee assistance are introduced. Other topics examined include sex and work, office etiquette, hierarchy and gender equality, male and female management styles, and the gender basis of occupations. The legislative and legal frameworks in which the public service is managed are also examined. The class concludes with a consideration of the differentiated nature of personnel management in public and private contexts. This year, the class will focus upon an analysis of the job organization of the Government of Nova Scotia. We will work with the departments and investigate the current developments in classifications, job design and job evaluation. For information about class assignments and other requirements, please consult the instructor.

INSTRUCTOR: M. Cassin

### **PUAD 6620.03: Women, Men and Management.**

The conventional view is that management is gender neutral work which in principle can be practiced routinely by both men and women. Accordingly, the absence of women in public sector management is to be explained by the lack of suitable qualifications and the remedy is to provide more opportunities to acquire such qualifications as are needed for managerial employment. This class critically assesses this view of gender opportunity in the public sector. First, it explores the gender objectivity and neutrality claims that are made about the character of management and management practice. Second, it examines the relationship of positions, gender and merit in the public service. Third, it discovers and explores a "line of fault" between the ideology of management and the experience of men and women in the public service. On the basis of this exploration the class seeks to develop management ideas and practices which recognize and include both men and women and provide a basis for them to work together as social equals. Please consult the instructor for information about class assignments and other requirements.

INSTRUCTOR: M. Cassin

### **PUAD 6625.03: Special Topics in Human Resource Management.**

Organizations have been designed to carry out occupationally differentiated and hierarchically arranged work. This basic arrangement is increasingly challenged by different groups in society. This class explores three contemporary issues surrounding traditional conceptions of managerial organization and work: a) control and governance; b) the human dimension of work, including race relations, sexual orientation and physical disabilities; and c) the environment. For information about class assignments and other requirements, please consult the instructor.

INSTRUCTOR: M. Cassin

### **Cross-Listed Classes**

#### **PUAD 2000.06: Administrative Law.**

#### **PUAD 5518.03: Antitrust Economics.**

INSTRUCTOR: C. Marfels

#### **PUAD 6300.03: LIBS Government Information Resources.**

#### **PUAD 6240.03: Social Cost-Benefit Analysis.**

INSTRUCTOR: T. Pinfold

#### **PUAD 6400.03: Local Government.**

INSTRUCTOR: D. Cameron

### **PUAD 6775.03: Management of Sustainable Development.**

Sustainable development has become a defining concept in public policy debates during the late 20<sup>th</sup> Century, yet it is widely misunderstood and misused. This seminar explores the various dimensions of the concept, drawing upon a wide variety of disciplinary literature, including that of ecological economics. This class is not just for a disciplinary or even interdisciplinary understanding, but rather for a transdisciplinary framework that will provide a new way of thinking about the future of our globe as we pass into a new millennium. Since the path of inquiry enters incompletely charted territory, the course is experimental and participatory, joining faculty, guest speakers and a small number of students in a creative quest.

INSTRUCTOR: S. Wood

PREREQUISITES: Graduate student in any programme (submit a curriculum vitae), and an interview with the instructor

CROSS-LISTING: ENVI 5030.03

### **PUAD 6780.03: Comparative Development Administration.**

This class examines some important aspects of public administration in developing countries in comparative perspective. It is divided into three broad sections: (1) the characteristics of developing countries and the distinguishing features of "development administration"; (2) the structure, organization, and management of public sector organizations charged with "managing development"; and (3) the impact of trends in bi- and multi-lateral aid on development.

administration. Issues of special interest will include: the political setting of public administration in developing countries, notably the trend towards "democratization"; the relevance of lessons from "Newly Industrializing Countries" (NICs) for other developing countries; and the impact of Structural Adjustment conditionalities on public sector organizations.

The class is organized around a weekly seminar consisting of presentations and discussion. For additional information about class requirements, please consult the instructor.

INSTRUCTOR: D. Black

### **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 6850.03: Internship, Co-op.**

INSTRUCTOR: F. Siddiq

### **PUAD 6900.06/ 6910.03/ 6920.03/ 6944.06/ 6940.03/ 6942.03: Directed Reading.**

A special programme 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.

NOTE: **Approval must be obtained from the Graduate Coordinator before the class begins.**

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.

### **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. Hardware configuration, software concepts and system, and data base management issues, as well as system analysis, design, and evaluation will be introduced. Operating, tactical, and strategic management uses of MIS are covered. Applications form marketing, purchasing, production, personnel management, and finance will be studied.

CROSS-LISTING: BUSI 5511.03

### **MPA (Management) Classes**

#### **MGMT 5105.03: Government Structure.**

Students will develop knowledge and understanding of the principal features of structure in Canadian government. The class will provide the students with the capacity to address the major issues in organizational designs for public management. Each student will achieve a practical understanding of the ways in which constitutional principles, definitions of best practice in public management, political dynamics, and patterns of organizational behaviour shape the actual structures of organizations in the public sector.

#### **MGMT 5110.03: Management in the Public Sector.**

This class will explore management theory and practice in the context of the environment and challenges of the public and not-for-profit sectors. The class will define and describe the characteristics of strategic management in governmental policy development, planning, and operations; discuss the relevance and applicability of strategic management in the public sector; examine lessons learned from the corporate, for-profit sector; and provide an overview of the different models of strategic planning systems. The class will focus upon the strategic planning process as a key component of strategic management.

#### **MGMT 5125.03: Policy Form & Analysis.**

Students will explore and analyze the characteristics of public service organizations. The class will promote understanding of the methods of investigation which will be used to demonstrate how the contemporary public service works and how it is known and understood. The class will examine a variety of features of modern public service, including the varying expressions of organizations in human knowledge, consciousness, and behaviour; creation of authority; decision-making and performance; and organizational relations and products.

#### **MGMT 5135.03: Managerial Economics.**

This class introduces the fundamental concepts of microeconomics and helps to develop the analytical skills of participants. It provides an understanding of basic microeconomic theories and principles in considerable depth and is also concerned with the use and application of microeconomic theory and the relevance of this theory in economic decision-making. The class emphasizes both similarity and contradictions between economic theory and observation. Together with the finance class in the second year, this class provides the tools to understand the relationship between economic theory and economic policy. Class material will blend theoretical rigor, empirical relevance, and sound policy, using examples drawn from the Canadian economy.

#### **MGMT 5146.03: Quantitative Research Methods.**

This class develops a basic understanding of both the potential and the limitations of quantitative methods in the policy and administrative process. Students develop the ability to use computer programs, with an emphasis on interpretation rather than calculation.

#### **MGMT 5155.03: Financial and Managerial Accounting.**

This class improves the understanding and critical appreciation of the competent manager. This is a conceptual, user-oriented class which emphasizes exploration, analysis, and evaluation.

### **MGMT 5160.03: Public Sector Financial.**

This class focuses on the public policy and management issues of governance. The student will explore such contemporary issues as: How can governments make budgetary commitments to programs with assurances that monies will be spent to reach their political objectives? How can a civil service be accountable to its ministers? How is the executive accountable to the legislature? How have recent government reforms increased the capacity of governments to measure, know, understand their "performance"? Have the reforms -- such as alternative service delivery, agencies, privatization -- changed the nature of accountability? The students will develop skills and techniques that will allow them to critically assess contemporary approaches to and techniques of financial management in the public sector; gain personal resources for working in the areas of budgeting, programming, reporting, and accountability frameworks at the provincial level of government; gain experience by developing an application in financial administration for a cooperating agency, e.g., business plan development, performance measurements, bench marking, program costing.

### **MGMT 6501.03: Business & Government.**

The aim of this class is to explore the relationship between the worlds of business and government. The class begins by outlining the different logic and ethical codes of businesses and bureaucracies and the proceeds to examine the dynamics of interaction between the two sectors. Class topics are focused on the real world of business-government relationships

### **MGMT 6525.03: Program Evaluation.**

This class will introduce the student to this professional field, including theory, methods, and issues in practice. Students will acquire knowledge and skills to assess the feasibility of and to design a program evaluation. Program evaluation is required by all levels of government, funding agencies, and other organizations that play a part in any public sector initiative program. The seminar readings and discussion will track developments in program evaluation in the Canadian context and internationally. Topics to be examined include the values underlying evaluations, evaluation design, alternative approaches to evaluation, the implementation and utilization of evaluations, and the relationship between program evaluation and the larger accountability frameworks within which governments work.

### **MGMT 6555.03: Managing Information Resources.**

Students will examine a multitude of technological changes impacting public administrators. The students' objective is to become knowledgeable about the technological changes in Canada and understand the opportunities and problems that these changes present for public administrators. The class will accommodate all levels of knowledge in technology; assignments will be tailored to each student's needs. The class will use WebCT software, which provides much of the class over the Internet through a Web browser. However, there will still be class meetings to discuss the class material.

### **MGMT 6600.03: Citizen-Oriented Government.**

This class provides the student with an analytic framework which will have practical application on their relations with citizens and citizen groups. The student will develop an understanding of how to analyze the forces compelling governments to engage the public in policy-making and service delivery, explore both the theory and practice of public consultation, and investigate recent strategies for fostering citizen-oriented management in service delivery.

### **MGMT 6620.03: Diversity and Equity Management.**

This class takes up a key dimension of employee relations as they are emerging in the human rights and representativeness environment. Equity and human rights (along with new occupational health and safety concepts and requirements) introduces a variety of dimensions of "difference" into organizational settings. These create challenges which employees, management theory and practice, and managers are largely ill-equipped to handle. The class explores the character of

the "differences" which are being introduced, how they "problematize" current organizational practices and assumptions, and the opportunities created by these "troubles".

### **MGMT 6650.03: Human Resource Management.**

This class develops skills, techniques, and knowledge that enhance the managers' capacity to deal with human resource responsibilities. The class provides knowledge in both a practical and theoretical manner. Topics include merit, design and definition, pay, performance, institutional coherence, equity and diversity, union/management relations, collective agreements, corporate commitment, training, and leadership. The student will develop an understanding of these issues by exploring both Canadian and international materials which will bring forward the organizational and public interest issues in the management of people in the public service.

### **MGMT 6700.03: Managing People.**

This class develops a practical understanding of how to deal effectively with human problems in organizations. The focus of the class is management behaviour in the process of working with people to produce effective results. Students will acquire their understanding of the course material through the examination of the following topics: motivation, leadership, communications perception, values and ethics, personality leadership, organizational politics, group dynamics, intergroup behaviour, basic resource functions, and strategies for optimizing human resources.

### **MGMT 6750.03: Analytical Methods for Organizational Change.**

This advanced graduate class considers the strategies and methods supporting the institutional analysis used to guide recommendations for organizational change, renewal, and re-engineering in the public sector. How do we come to understand the work of the civil service? What information is required to be informed and recommend change? The class uses both seminar and workshop sessions. The workshop component will explore the programme review and restructuring experiences of the Nova Scotia civil service as a case study

# Social Work

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Location: 6414 Coburg Road  
Halifax, NS B3H 2A7  
Telephone: (902) 494-3760  
Fax: (902) 494-6709  
E-mail: social.work@dal.ca  
Website: <http://www.dal.ca/socialwork>

## Acting Director of the School

Wien, F.

## Graduate Coordinator

Harbison, J.

## Administrative Staff

Densmore, J., BA (Dal), BEd (St. Mary's), Coordinator Admissions  
Ferris, E., BSc, HEC (MSVU), Administrative Officer  
Ghiz, L., BA (UKC), MSW (Dal), RSW, Coordinator Distance and Continuing Education Programmes  
Hildebrandt, Z., Distance and Continuing Education Programme Assistant  
Keddy, M., BA (Acadia), MSW (Dal), Coordinator of Field Programmes  
Leadbeater, L., DipSSc(HCVS), Coordinator Student Services  
McInerney, M., BSc(Hons) (Dal), CertAEd., Research Assistant  
Trueman, J., BOA(MSVU), Administrative Secretary

## Professors

Carlson, R.W., BS, MSW (Penn), PhD (Chicago)  
Drover, G., BA (Toronto), MSW (Fordham), PhD (London School of Economics)  
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)  
O'Day, R., BA (UBC), MA, PhD (Michigan)  
Thomas-Bernard, W., BA (MSVU), MSW (Dal), PhD (Sheffield)

## Assistant Professors

Brown, C., BA, MA (Manitoba), MSW (Carleton), PhD Candidate  
MacDonald, M.M., BA (StFX), BJ (Carleton), MSW (Dal), PhD (U of Warwick, U.K.)  
Richard, B.K., BA (MtA), MSW (Dal)

## Lecturers

Fay, J., BA (New Hampshire), MSW (Dal)  
MacDougall, G., BA (Western), MSW (King's)  
Sexton, A., BA (St.Thomas), MSW (Dal)

## I. The Maritime School of Social Work

The Maritime School of Social Work was founded in 1941 as an independent school serving the needs of the region for professionally educated social workers. The political, social, cultural, and economic conditions of the Maritime provinces have continued to give direction to the School's teaching programmes since its amalgamation with Dalhousie University in 1969. It has pioneered in developing theories of practice that take account of systemic inequalities based on factors such as gender, sexual orientation, race, culture, ethnicity, class and (dis)ability.

Both the undergraduate and graduate programmes are accredited by the Canadian Association of Schools of Social Work. The School also offers a diversified Continuing Education programme.

## II. Master of Social Work (MSW) Degree

The Master of Social Work degree programme is offered in Halifax and by distance learning methods throughout Canada. It provides professional education for advanced, specialized social work practice and leadership positions in the practice field.

Opportunity for in-depth learning is provided both in the classroom and in the field. The student's critical abilities are developed in relation to a variety of content areas including social policy, social work methods and social work values, especially with regard to social justice. Elective classes enable the student to focus on areas of special interest.

Please consult our web site for updates to our MSW Degree programme.

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. The Specializations

Two areas of specialization for the development of practice are offered:

- Community Practice, and
- Individual and Family Practice, in either of two concentrations:
  - Physical and Mental Health or
  - Family and Child Welfare

#### 1. Community Practice

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.

#### 2. Individual and Family

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 Welfare 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.

### B. Programme Objectives

The Maritime School 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 programme, 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.

### 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 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 February 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. MSW Degree Programme Prerequisites

The MSW programme of advanced study in the theory and practice of Social Work is primarily intended for persons with a baccalaureate degree in Social Work and at least two years of social work experience. Successful candidates are able to complete the programme within eleven months or less of full-time or three years of part-time study.

Prerequisites for the one-year MSW degree programme 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;
- 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.

#### B. Qualifying Year and Two Year Programme (Not Offered to Those Taking the Programme by Distance Education)

Persons who do not have a Bachelor of Social Work degree may apply for a qualifying year provided that they have the following prerequisites:

- An outstanding employment background in social work or related community work for a duration of approximately five years;
- An undergraduate or graduate degree in a related academic discipline, with content that facilitates a five-credit preparatory year of Social Work study;
- Personal suitability for social work education and practice.

Only a very limited number of applicants have the academic and employment backgrounds to be admitted to a qualifying year, which consists of five credits of study. A modified application for admission to the MSW degree programme is required on completion of the qualifying year credits, at which time the student's academic performance and personal suitability is reviewed by the Admission Committee.

Persons who meet the above prerequisites and who hold a graduate degree in a closely related discipline may be admitted to the first year of a two year MSW programme. During this first year, they need to satisfactorily complete certain advanced undergraduate social work classes.

#### C. Special Students

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 qualifying year and the MSW degree programmes.

#### D. Distance Education

The individual and family specialization of the MSW Programme is offered by distance delivery methods, on a part-time basis, to students throughout Canada. Admissions and Curriculum requirements are the same as for the on-site programme.

#### E. Full-time and Part-time Study

The graduate programme may be taken full-time (by Halifax on-site students only), or part-time (by Halifax on-site and distance students). Classes begin in September only. Full-time MSW students who take a classes only option may expect to complete the programme by July of the following year or earlier and to graduate in October. Full-time students who elect to do a thesis should expect to spend six to twelve months more for completion. Part-time students who take a classes only option may expect to spend three years to complete the programme, 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 annual registration and payment of continuation fees.

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.

#### F. Selection Criteria

The number of places offered each year to graduate students is limited. 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;
- 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 (proposal of study); 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 personal references;
- Appropriateness of educational/professional goals to the School's class offerings;
- Personal suitability for social work.

#### G. Proposal for Study

The student's plan of study for the MSW Programme is presented in a formal Proposal for Study, which is an important component of the MSW application material. Candidates specify their choice of specialization (and concentration); indicate the relationship of their background experience to the chosen area of study; and discuss where they intend to focus their learning and why. Applicants for the qualifying year are assessed on similar standards of excellence as candidates for the one-year MSW degree.

#### 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 programme. (See Section V: Required Withdrawal on Grounds of Unsuitability section.)

#### I. Affirmative Action Policy

The Maritime School of Social Work has an affirmative action policy for residents of the three Maritime provinces who belong to regional Aboriginal, Acadian and indigenous Black populations, and for persons with disabilities. The School is committed to admitting and graduating students who qualify under this policy. A detailed policy to apply this commitment to the national distance programme is currently being developed.

The admissions prerequisites described in the above sections 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 February 1st.

MSW application packages include instructions, the three required reference forms, work/volunteer experience summary sheets, and guidelines for the Proposal for Study. 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: <http://www.dal.ca/socialwork>.

Incomplete and late applications cannot be considered. Each applicant is notified by mail of the 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 and the School's MSW brochure.

## L. Sexual Harassment

The Maritime School is governed by the Sexual Harassment Policy and Procedures of Dalhousie University. For more information, see Graduate Calendar: Resources and Services - Advisory Committee on Sexual Harassment.

# IV. Curriculum Requirements

## A. Qualifying Year

Students who meet the requirements for acceptance to a qualifying year undertake a five-credit programme of preparatory study based on individual needs as assessed by the Graduate Coordinator. Classes consist primarily of BSW class content offered in the regular Fall/Winter academic session.

## B. MSW Degree Programme

Qualified BSW graduates are admitted directly to the regular one-year MSW programme. The class of study also applies to those students who have successfully completed their Qualifying Year requirements.

The professional MSW degree programme consists of five Social Work credits and a non-credit colloquium. This requirement cannot be reduced by advanced placement or transfer credit in relation to any graduate classes taken prior to MSW registration.

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 6401.03: Field Work - Family(400 hours)(0.5 credit) OR SLWK 6411.03: Field Work - Health (0.5 credit)
- SLWK 5990.00: Colloquium (non-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 and a half (1.5) credits of Elective classes with the Thesis SLWK 9000 (0.5 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 6421.03: Field Work - Community (400 hours)(0.5 credit)
- SLWK 5990.00: Colloquium (non-credit)
- Two (2.0) credits of Elective classes with the classes only MSW degree option OR
- One and a half (1.5) credits of Elective classes with the Thesis SLWK 9000 (0.5 credit) option.

### Electives

The following Social Work electives are usually offered:

- SLWK 6365.03: Community Socio-Economic Development (0.5 credit)
- SLWK 6370.03: Advanced Practice Skills (0.5 credit)
- SLWK 6385.03: Community & Social Change Analysis (0.5 credit)
- SLWK 6500.03: Interventions with Families (0.5 credit)

At least one 0.5 credit elective must be taken outside the Maritime School of Social Work. This applies to both Thesis and Non-Thesis students.

## C. Field Experience

Students should note that the 0.5 credit field work class includes a field experience component of 400-500 hours in an appropriate agency other than the student's place of employment. These are undertaken concurrently between September and April. The MSW Field Manual contains the policy and procedures which define various aspects of the field placement.

## D. Class Sequencing for Part-Time Students

In order to maintain the integrity of the part-time student's academic programme, classes are taken in a prescribed sequence. First year classes include Theory and Practice of Anti-Oppressive Social Work, and the Integrated Approaches to Practice class relevant to the student's specialization/concentration. Second year classes include either Critical Perspectives on Social Work Practice Interventions (Individual and Family Specialization) OR Social Policy Issues and Analysis for Social Work Practice (Community Specialization), and the Field Work Class (400 hours of field practice and a bi-weekly field work classroom seminar). Third year classes include Social Work Practice Research and the Research Proposal Seminar Class.

The Colloquium is taken monthly during the full-time year on-site. It may be taken in any year in the on site part-time programme but only in the year it is offered in the distance delivery program.

Electives may be taken at any time during the Full-time or Part-time programme according to availability and the student's workload.

## V. Regulations

All students are required to be familiar with and to observe University, Faculty of Graduate Studies and Maritime School of Social Work regulations. Students should therefore request a Graduate calendar when they register.

### 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 each class may be withdrawn from the programme. Students who are withdrawn may submit a formal, written request to be readmitted. If the student is allowed to continue in the programme,

the failed or uncompleted class or classes must be repeated if core, repeated or replaced if elective, and successfully completed with a final grade of at least "B-".

### **C. Required Withdrawal on the Grounds of Unsuitability**

The MSSW acting through its Programme 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 Programme Committee, are requirements for continuation in the programme.

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:

- (i) conviction of criminal activity (e.g. assault, sexual assault, fraud and drug trafficking).
- (ii) persistent substance abuse (e.g. alcoholism, drug addiction, use of illegal drugs).
- (iii) 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.
- (iv) 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.

## **VI. Classes Offered**

### **SLWK 5110.03: Africentric Perspectives in Social Work.**

CROSS-LISTING: SLWK 3110.03

### **SLWK 5990.00: MSW Colloquium.**

Contemporary issues in social work are discussed monthly during each term. Topics and guest speakers are generated in consultation with students.

### **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.**

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 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, intended primarily for students in the Individual and Family Practice Specialization, 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 6380.03: The Social Policy Context of Community Work.**

This class is divided into two parts: (a) Theoretical interpretations of the current and projected status of the welfare state in advanced industrial societies, and consideration of the economic, political, social and demographic factors that lead to change in social policy. And (b) an in depth examination of several policy areas that are most relevant for community work such as income support, affirmative action and employment equity, education and training, and employment and economic development.

### **SLWK 6381.03: Social Policy Issues and Analysis for Practice.**

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 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 6400.03: Integrated Approaches for Practice -- Family and Child.**

This class examines social policy and social work practice relevant to the 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, and disability.

### **SLWK 6410.03: Integrated Approaches for Practice in Health Systems.**

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 6420.03: Integrated Approaches to Community Practice.**

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 6401.03: Field Work Class - Family.**

### **SLWK 6411.03: Field Work Class - Health.**

### **SLWK 6421.03: Field Work Class - Community.**

The Field Work class is intended to provide students with opportunities to integrate learning in the classroom into their practice through a supervised field work experience in the social practice field that is the focus of their learning in the MSW Program. It includes 400 hours of practice in the field and a concurrent bi-weekly classroom seminar.

### **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 9000.00: Master's Thesis.**

Students may choose a thesis option with the approval of their Faculty Advisor and the MSW Committee. This option requires the student to extend their time in the Programme by at least six months full-time and eighteen months part-time.

## **Sociology and Social Anthropology**

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Location: 6135 University Ave.  
Halifax, NS B3H 4P9  
Telephone: (902) 494-6593  
Fax: (902) 494-2897  
E-mail: SOSAGrad@is.dal.ca

### **Chairperson of Department**

Thiessen, V.

### **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  
Benoit, J., BA, MA (Guelph), PhD (Johns Hopkins). Major appointment in Henson College of Public Affairs and Continuing Education. Complex organizations, fire service management, rural sociology.  
Binkley, M., BA, MA, PhD (Toronto). Maritime Anthropology; Coastal communities; Anthropology of Tourism; Women and Work; Qualitative and Quantitative Research Methods.  
Cohen, F., BA, MEd (Harvard), PhD (Minn). Major appointment in the School for Resource & Environmental 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.  
Clairmont, D.H., BA, MA (McMaster), PhD (Wash). Social Problems; Public Policy; Justice; Work; Ethno-cultural Relations  
Keddy, B., BScN (MSVU), MA, PhD (Dal), RN, Major appointment in the School of Nursing. Social gerontology, medical sociology, sex and gender.  
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

### **Associate Professors**

Butler, P.M., BA (MUN), MA (UNB), PhD (Toronto). Power; Public Opinion; Politics; Quantitative Methods; Public Opinion Polling; Canadian Society; Occupations; Telework.  
Gardiner Barber, P., BA, MA (Auckland), PhD (Toronto). Culture of Political Economy; Development Discourse; Gender and Work; Globalization; Feminist Studies; Philippines; Transnationalism  
Jarman, J., BA, MA (Toronto), PhD (Cambridge). Occupational Gender Segregation; Gender and Careers; Sociology of Work; Gender Studies  
Li, T., BA, PhD (Cambridge). Development; Rural; Class; Culture; Theory; Gender; Property; Indonesia; Communities; Livelihoods  
Morgan, J.G., BA (Nott), MA (McMaster), D Phil (Oxon). Religion; Theory; Science; Knowledge.  
Murphy, C.J., BA (StFX), MA (Dal), PhD (Toronto). Sociology; Social Order; Control and Criminal Justice; Comparative and Alternative Policing  
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

DuBois, L. BA (McGill), MA, PhD (New School-NY). History and Anthropology; Political Culture; Argentina; Latin America; Human Rights  
Findlay, D., BA, BSW, MA, PhD (McMaster). Medical Sociology; Sociology of the Body; Sociology of Gender, Women's Health  
vanRoosmalen, E., BA, MA (Waterloo), PhD (Alberta). Gender Relations, Womens' Health; Adolescent Health; Quantitative and Qualitative Research Methods

### Adjunct Professors

Elliott, D., BA (Yale), PhD (Pitt)  
Frank, B., BA, BEd, MEd (Acadia), PhD (Dalhousie)  
Gamberg, H.V., BA (Brandeis), AM, PhD (Princeton)  
Graham, J.E., BA (Waterloo), MA (Victoria), PhD (Montréal)  
Kaill, R.C., BA (Dalhousie), BD, MA (Toronto), PhD (McGill)  
Kasdan, L., MA, PhD (Chicago)  
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  
Raymond, B., MA, MLS (Univ. Of California - Berkeley), MA (Manitoba), PhD (Chicago)

### Research Associates

McCormick, C., BA (Acadia), MA (Queen's), PhD (York)  
Thomson, A., BA, BEd, MA (Dal), PhD (Cambridge)

## I. Admission Requirements

The Department of Sociology and Social Anthropology offers programmes leading to the M.A. in Sociology, the M.A. in Social Anthropology, and the Ph.D. in Sociology.

All candidates who are applying to the M.A. programme 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 programme.

All candidates who are applying for the Ph.D. in Sociology 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 programme 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.

## II. Degree Programmes

### A. Master of Arts (MA)

A full-time MA programme 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 programme is made up of five full credits. A thesis (SOSA 9000.00), worth two credits, is required as are the following classes: Graduate Seminar (SOSA 5200.06R) and Area Examination (SOSA 5300.06R). 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 programme has a two year residency requirement. It is expected that the programme 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 programme. 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 programme, the student will not be permitted to continue in the programme. In accordance with Faculty regulations, an oral defense of the thesis is required.

## III. Classes Offered

Classes may not be offered every year. Please consult the current timetable upon registration to determine if these classes are offered.

### SOSA 5001.03A or B: Survey Methods.

This class will examine techniques and issues in survey methods. Topics covered will include sampling designs, questionnaire construction, measurement theory, data collection, and pre-tests. As well, this provides instruction in the organization and presentation of quantitative data, including graphs, charts and tables using computer software such as SPSS. Depending on the instructor, practical experience in survey methods is provided through secondary analysis of an existing data set, or through a class project.  
FORMAT: Seminar 2-3 hours

### SOSA 5002.03: Social Statistics.

This class develops statistical approaches to social science data, focusing on correlation/regression analysis. Beyond developing a basic competence in statistical analysis, the class stresses the creative process of constructing solid scholarly arguments using statistical principles, as well as uncovering artifacts which weaken them. In lieu of a term paper, weekly assignments are given using existing social science data which provides students the opportunity to participate in this process. The class includes both lectures, in which the logic of statistical reasoning is presented, and laboratories, in which statistical techniques are applied to social science data using computer software programmes such as SPSS.  
FORMAT: Lectures/lab 2 to 3 hours

### 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 2 to 3 hours

### SOSA 5004.03: Advanced Issues in Work, Industry and Development.

Each year, this "advanced issues" class focuses on a different specific topic within its general area. In 1999, its focus was on Globalization. Consult Department for the specific topic for 2000/2001.

**SOSA 5005.03: Advanced Issues in Social Injustice and Social Inequality.**

Each year this "advanced issues" class focuses on a different specific topic within its general area. In 1998, its focus was on understanding Restorative Justice. Consult Department for the specific topic for 1999/2000.

**SOSA 5006.03: Advanced Issues in Health and Illness.**

Each year, this "advanced issues" class focuses on a different specific topic within its general area. In 1998, its focus was on Darwinian and Other Alternatives to Biomedicine. Consult Department for the specific topic for 1999/2000.

**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 2 to 3 hours

**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 2 or 3 hours

**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.

**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, behavioural ecology and primate behaviour. 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 ethnocentrism, racism, sexism, and crime). FORMAT: Seminar 2-3 hours

**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 programme. 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 2 to 3 hours

**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 Programme Committee in consultation with the student.

**SOSA 5301X/Y.06: Issue Essay I.**

The student writes a major essay on an issue of sociological importance. The student's three-person Advisory Committee jointly: (a) supervises the (library) research required; (b) prepares a schedule for the preparation of drafts; and (c) evaluates the final draft.

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.

**SOSA 5302X/Y.06: Issue Essay II.**

The student writes a major essay on an issue of sociological importance. The student's three-person Advisory Committee jointly: (a) supervises the (library) research required; (b) prepares a schedule for the preparation of drafts; and (c) evaluates the final draft.

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.

**SOSA 5303X/Y.06: Issue Essay III.**

The student writes a major essay on an issue of sociological importance. The student's three-person Advisory Committee jointly: (a) supervises the (library) research required; (b) prepares a schedule for the preparation of drafts; and (c) evaluates the final draft.

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.

**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.**

SOSA 9530.00: Ph.D. Thesis.

# Statistics

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Location: Chase Building  
Halifax, NS B3H 4H7  
Telephone: (902) 494-2572  
Fax: (902) 494-5130  
Website: <http://www.mscs.dal.ca/home2.html>

## Chair of the Department

Nowakowski, R.J.

## Director of Division

Hamilton, D.

## Professors

Field, C.A., MSc, PhD (Northwestern). Robust statistics, data analysis.  
Gabor, G., MSc, PhD (Eotvos). Statistical inference, information theory.  
Gupta, R.P., MSc (Agra), PhD (Delhi). Multivariate analysis, distribution theory, statistical inference.  
Hamilton, D., MA, PhD (Queens). Linear and nonlinear regression, time series analysis, data analysis.  
Thompson, K., MSc (Manchester), PhD (Liverpool), joint appointment with Oceanography. Time series analysis, applications to oceanography.

## Associate Professors

Smith, B., MSc (Calgary), PhD (Berkeley). Time series analysis, applied probability, data analysis.

## Assistant Professors

Bowen, K., PhD (Calif)  
Susko, E.A., MSc (UBC), PhD (Waterloo). Mixture models, large sample theory, optimization, data analysis.

## Adjunct Professor

Gupta, R.D., PhD (Dalhousie). Multivariate distribution theory.  
Astatke, T., PhD (Queens). Time series, applications to agriculture.

## Statistical Consultant

Blanchard, W., MSc (UBC)

Please refer to the entry for the Department of Mathematics, Statistics and Computing Science in this calendar for a full listing of the members of the Department and information on other programmes offered by the Department.

The department offers programmes leading to the degrees of MSc and PhD in the following areas: statistical inference, robust statistics, data analysis, multivariate analysis, linear and nonlinear regression, time series analysis, statistical graphics and computing, 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 recognized 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 Programmes

### A. Master of Science (MSc)

#### 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 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.
5. Fifty hours consulting.

### B. Doctor of Philosophy (PhD)

#### Requirements

NOTE: The minimum and maximum time required to complete this programme 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 must be taken for the first time within 12 months and successfully completed within 16 months of registration in the programme.
3. Attendance and participation in an appropriate seminar.
4. Preparation and defence of a satisfactory research thesis.
5. Fifty hours consulting.

## III. Classes Offered

A selection of the following graduate classes will be offered subject to demand.

### STAT 5065.03: Advanced Statistical Theory I.

### STAT 5067.03: Advanced Statistical Theory II.

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 5075.03: Multivariate Analysis.

### 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 behaviour 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 programmes 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 5990.03: Intermediate Statistics for Health Sciences.**

FORMAT: Lecture 3 hours.  
PREREQUISITE: STAT 1060.03 or equivalent. Cross-listing: NURS 5000.03, PHAR 5980.03, LEIS 5503.03, KINE 5503.03, HEED 5503.03, HESA 6500.03. Restriction: Not open to graduate students in Mathematics, Statistics and Computing Science

#### **STAT 7320.03 Statistics Seminar.**

# Urban and Rural Planning

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Location: 5410 Spring Garden Road  
Halifax, NS  
Mail: Department of Urban and Rural Planning  
Faculty of Architecture  
Dalhousie University  
P.O. Box 1000  
Halifax, NS B3J 2X4  
Telephone: 902-494-3260  
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E-mail: [planning.office@dal.ca](mailto:planning.office@dal.ca)  
Website: [www.dal.ca/planning](http://www.dal.ca/planning)

## Head

Poulton, M.C.

## Professors

Palermo, F., BArch (Toronto), MArchUD (Harvard), MCIP  
Poulton, M.C., BSc, MPhil (London), MS, PhD (Calif. at Berkeley),  
MCIP, MRTPI

## Assistant Professor

Guppy, S., BSc (Nottingham), MSc, PhD (Wales), MArch  
(Columbia), MCIP

## Adjunct Faculty

Epstein, H., BA (Carleton), LLB (Dal)  
Fraser, P., BComm (Dal), MBA (St. Mary's), MURP (TUNS)  
Grant, J. BA (UWO), MA (McMaster), MA, PhD (Waterloo)  
Manuel, P., BA (Carleton), MSc (McGill), PhD (Dal)  
Wishart, B., BA (UNB), BEd (Lakehead), MURP (Queen's), MPA  
(Dal)  
Zuck, J., BA (Hiram), BDEP (NSCAD), MBA (UPennsylvania)

## Departmental Secretary

Leslie, D., BA (MSVU)

## I. Introduction

The Department of Urban and Rural Planning provides a professional planning education at the graduate level. The programme is recognized by the Canadian Institute of Planners. Many graduates of the programme will become professional planners working for private firms or for government. Others will find that the education provides a solid foundation for careers in related spheres such as international development, environmental protection or urban design.

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 develop a wide range of policies affecting the character and potential of rural and urban areas, and are the guardians of the environment and the heritage of communities. Working as consultants or specialists in the private sector, planners undertake a wide variety of tasks ranging from the control of physical design to the creation of strategies for sustainable development. Planners work throughout the world from the heart of Canada's towns and cities to the fields and villages of the Third World.

Instruction is at the graduate level and encourages initiative, resourcefulness and creative questioning of received doctrine. The educational programme of the Department emphasizes: (a)

up-to-date skills; (b) a sound appreciation of the environmental, social and economic processes that propel the evolution of rural and urban societies and their physical forms; (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.

## A. Co-Op Work Term

The MURP programme includes a four-month work term that provides students with practical experience in planning. The Co-op Co-ordinator for the Faculty of Architecture assists students in finding suitable work-term placements. In recent years, Planning students have been employed throughout Atlantic Canada and most other Canadian provinces, and some have chosen to work abroad - in the United States, Gambia, Indonesia, the Philippines, and Thailand.

## B. Professional Registration

On completion of the MURP degree, and after further professional experience, graduates are eligible for full membership in the Canadian Institute of Planners (CIP). A foreign applicant is advised to contact his/her national accreditation organization about requirements for professional registration.

## II. Degree Programmes

### A. Master of Urban and Rural Planning (MURP)

MURP is a two-year programme consisting of six required classes, eight elective classes, a co-op work term and a thesis. It may be completed through full-time or part-time study. The first year consists mainly of required classes, followed by a summer co-op work term. The second year emphasizes elective classes in the fall term and thesis in the winter term.

The required classes provide the essential elements of a planning education. They cover: planning theory; planning methods, skills and computer applications; institutional and environmental contexts; and experience in the use of planning skills and knowledge.

The elective classes enable students to pursue individual interests. Classes offered within the Department are linked primarily to: urban communities; rural and regional planning; environment and sustainable development; and housing and real estate development. Extramural classes may be taken at other universities in Halifax, and elective credit may be given for suitable classes taken at other universities in Canada and abroad.

### B. Master of Engineering/Master of Urban and Rural Planning (MEng/MURP) and Master of Applied Science/Master of Urban and Rural Planning (MASc/MURP)

These joint degrees require programmes of study that satisfy both the MURP requirements and the MEng or MASc requirements of the Department of Civil Engineering. Normally a student must:

- take the required classes needed for each degree;
- take sufficient electives to satisfy the requirements of each degree (with some or all of these satisfying the requirements of both degrees);
- complete a planning work term;
- undertake a thesis that is approved by both departments.

## III. Admission Requirements

### A. Minimum Academic Requirements

Each September, the Department admits approximately twenty students. The Department seeks students with high scholastic standing and demonstrated academic interests pertinent to planning which may include community experience. All candidates must meet the Admissions Regulations of the Faculty of Graduate Studies.

### Master of Urban and Rural Planning

MURP admission requires an undergraduate degree with high scholastic standing. Other applications will be considered when supported by career experience.

**Master of Engineering/Master of Urban and Rural Planning**  
 MEng/MURP admission 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 Urban and Rural Planning**

MASc/MURP admission 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.

**B. Inquiries**

Please contact the Department of Urban and Rural Planning for an application package, a brochure or additional information about MURP programmes. (The Department's phone number, e-mail 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. Transfer Students**

Applicants who have completed part of another graduate planning programme will be considered for transfer credit by the Admissions Committee. A transfer student must complete a minimum of six half-credits of classes and a thesis within the MURP programme to qualify for the degree.

**IV. Academic Regulations**

In addition to the Faculty of Graduate Studies regulations, the following applies to the Department of Urban and Rural Planning.

**Readmission**

A student who wishes to be readmitted to the programme, after withdrawing or failing to register for three consecutive terms, must reapply as though he/she were a new applicant to the programme.

**V. Classes Offered**

The sessional distribution of classes throughout the two years of the MURP programme is outlined below. All classes are required except those designated specifically as "elective".

Six required classes	8 half-credits
Eight elective classes	8 half-credits
Work term	non-credit
Thesis	non-credit

**Year 1 - Term 1 (Fall)**

- PLAN 5001.06 Studio - Urban Planning
- PLAN 5101.03 History/Theory of Planning
- PLAN 5102.03 Planning Practice
- PLAN 5103.03 Quantitative Methods

**Year 1 - Term 2 (Winter)**

- PLAN 5002.06 Studio - Rural Planning
- PLAN 5104.03 Planning Law
- 2 electives \*\*

**Year 1 - Term 3 (Summer)**

- PLAN 5201.00 Work Term

**Year 2 - Term 4 (Fall)**

- 5 electives \*\*

**Year 2 - Term 5 (Winter)**

- PLAN 9001.00 MURP Thesis\*
- 1 elective \*\*

**Thesis for Joint Programmes**

- PLAN 9002.00 MEng/MURP Thesis
- PLAN 9003.00 MASc/MURP Thesis

**Planning Electives**

- PLAN 6001.06 Studio/Research Project - Urban Planning
- PLAN 6002.06 Studio/Research Project - Rural Planning
- PLAN 6003.06 Studio - Housing

- PLAN 6101.03 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 6112.03 Computers in Planning
- PLAN 6201.03 Directed Studies (two available)
- PLAN 6304.015 Mid-Term Module (six available)

**Class Offerings**

Some required subjects may be interchanged between academic terms, depending on the availability of instructors. Elective classes in each term are subject to the availability of instructors and may have enrollment limits.

**Other Electives**

A student may also take up to four elective classes outside the programme. A graduate or senior-undergraduate class may be taken at another faculty in Dalhousie University; to enrol in the class, a student must receive prior approval from the Head of the Department of Urban and Rural Planning. A graduate or senior-undergraduate class may be taken at another university; to enrol in such a class, a student must obtain a Letter of Permission following the Graduate Studies Academic regulations. A student may take up to two senior-level undergraduate classes as part of the programme, with approval from the Graduate Coordinator.

**V. Class Descriptions**

**Class Numbers**

The first digit of a PLAN class number indicates whether it is a required class (5), an elective class (6), co-op work term (8), or thesis (9). The second digit indicates the class format: studio (0), lecture/seminar (1), directed studies (2), mid-term module (3), or extramural (4). The credit-hour extensions (.03, .06) indicate the approximate number of class hours each week. Note that not every elective class may be offered every year. Please consult the academic timetable for current listings, including classes that are open to students from other faculties/universities.

**PLAN 5001.06: Studio - Urban Planning.**

An introduction to land planning and development in urban settings. The class investigates fundamental aspects of planning. Specific "real world" projects are used to: (i) explore the procedural, physical, social, economic and polemical context for decision making; (ii) to apply skills in information gathering, analysis and synthesis; and (iii) to develop communication techniques. The class will concentrate on documenting the existing situation, formulating strategies for intervention, developing a specific plan and assessing the consequences of proposed changes.

FORMAT: Studio/seminar

RESTRICTION: MURP students, or permission of instructor

**PLAN 5002.06: Studio - Rural Planning.**

This class is a continuation of PLAN 5001.06, in a rural or small town setting.

FORMAT: Studio/seminar

RESTRICTION: MURP students, or permission of instructor

**PLAN 5101.03: History and Theory of Planning.**

An intensive examination of traditions, ideas and current issues in planning. The class will trace the historic development of planning, examine the foundations of the Canadian planning profession and critique the major theoretical directions of contemporary planning in Canada and abroad.

FORMAT: Lecture/seminar

RESTRICTION: MURP students, or permission of instructor

**PLAN 5102.03: Planning Practice.**

An exploration of the role of the planner and the planning process through lectures, seminars and case studies. The focus is on: (i)

understanding the institutional framework for planning including social, political and economic dimensions; (ii) examining approaches to community involvement, negotiation and policy formulation; (iii) developing effective communication skills; and (iv) significant current issues facing planners (including ethical questions).

INSTRUCTOR: B. Wishart

FORMAT: Lecture/seminar

RESTRICTION: MURP students, or permission of instructor

### **PLAN 5103.03: Quantitative Methods.**

An introduction to quantitative and research methods used in planning. The class covers simple statistics, population forecasting, economic multipliers, spatial location analysis and a range of research methods: surveys and questionnaires, interviews, observing, participant observation and participatory appraisal. These methods are used in a project of practical and immediate value.

INSTRUCTOR: M. Poulton

FORMAT: Lecture/seminar

RESTRICTION: MURP students, or permission of instructor

### **PLAN 5104.03: Planning Law.**

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: H. Epstein

FORMAT: Lecture/seminar

RESTRICTION: MURP students, or permission of instructor

### **PLAN 6001.06: Studio/Research Project - Urban Planning.**

An in-depth examination of current urban planning issues in a studio context. Students engage in a project which is of current concern and offers opportunities to advance research interests. The emphasis is on developing original solutions which are based on a clear understanding of the existing situation, the mechanics of development and the realities of implementation.

FORMAT: Studio/seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

### **PLAN 6002.06: Studio/Research Project - Rural Planning.**

An in-depth examination of current rural planning issues in a studio context. Students will undertake a project which is of concern to a rural area/small town and offers opportunities to advance research interests. The emphasis is on developing original solutions based on a clear understanding of the existing situation, the mechanics of change and the realities of implementation.

FORMAT: Studio/seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

### **PLAN 6003.06: Studio - Housing.**

An in-depth examination of current housing issues in a studio context. Students will undertake a project which focuses on some significant aspect of housing and offers opportunities to advance research interests. The emphasis is on developing original solutions based on a clear understanding of the existing situation, the possibilities for intervention and the realities of implementation.

FORMAT: Studio/seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

### **PLAN 6101.03: Urban Design.**

An introduction to urban design as a distinct area of professional knowledge and skill within the spectrum of planning concerns and specialities. Lectures, seminars and case studies deal with issues associated with the quality of the public environment, urban

design tools and implementation techniques. The relationship between architecture, urban design, and planning is emphasized.

FORMAT: Lecture/seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

EXCLUSION: ARCH 4104.02

### **PLAN 6102.03: Urban Economics.**

The application of economic principles to (i) urban growth and structure; (ii) urban social and economic problems; and (iii) the 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 behaviour.

INSTRUCTOR: M. Poulton

FORMAT: Lecture/seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

### **PLAN 6103.03: Urban Ecology.**

This class deals with cities as ecosystems - systems designed and built for people, but which must necessarily match the processes of natural ecosystems. Energy flows and material cycles are studied, as well as technologies which manage or intervene in these cycles. Through an extension of these ideas to include both other species and problems resulting from malfunctioning systems, the question of urban sustainability is addressed.

INSTRUCTOR: S. Guppy

FORMAT: Lecture/seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

### **PLAN 6105.03: Land Development Economics.**

The application of 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: P. Fraser

FORMAT: Lecture/seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

### **PLAN 6106.03: Transportation Planning.**

A critical analysis of the interplay between land uses and transportation. The class analyses transportation trends, the transport needs associated with different activities and the impact of transport facilities on land development. 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: M. Poulton

FORMAT: Lecture/seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

### **PLAN 6107.03: Regional Planning.**

A critical examination of the policies, theories, aims and achievements of regional development planning. The class focuses on (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.

FORMAT: Lecture/seminar

RESTRICTION: Graduate students in the Faculty of Architecture, or permission of instructor

### **PLAN 6108.03: History and Theory of Landscape Architecture.**

This lecture and seminar 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.

INSTRUCTOR: S. Guppy

FORMAT: Lecture/seminar

RESTRICTION: Graduate students in the Faculty of Architecture,  
or permission of instructor

EXCLUSION: ARCH 4106.02

### **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 neighbourhoods are designed. This understanding is placed in the context of differing economic, political and housing market situations.

INSTRUCTOR: J.G. Wanzel

FORMAT: Lecture/seminar

RESTRICTION: Graduate students in the Faculty of Architecture,  
or permission of instructor

EXCLUSION: ARCH 4103.02

### **PLAN 6112.03: Computers in Planning.**

The class will examine the use of computers in Planning for data management, accessing statistical data, geographical information systems (GIS), mathematical modelling, and presentation. These concepts will be covered both in theory and in practice, with students undertaking several small projects to implement the theoretical concepts. A larger project will be undertaken for the GIS component of the class.

INSTRUCTOR: P. Kelly

FORMAT: Lecture/seminar

RESTRICTION: Graduate students in the Faculty of Architecture,  
or permission of instructor

### **PLAN 6201.03/6202.03: Directed Studies.**

A student wishing to pursue an advanced aspect of planning for which no suitable graduate or senior-level undergraduate class is offered may request to do a Directed Studies class. Approval of the Department Head is required and the class must be taken under the direction of a departmental faculty member. A maximum of two such classes in any student's programme is permitted.

FORMAT: Seminar

RESTRICTION: Graduate students in the Faculty of Architecture,  
or permission of instructor

### **PLAN 6304.015-6409.015: Mid-Term Module.**

Each term, the Department offers a one-week module. In the fall, the module is normally a study visit. In the winter, the module is usually an intensive professional development workshop on an important contemporary planning theme that brings together students, professional practitioners and high-calibre resource personnel.

FORMAT: Variable

RESTRICTION: Graduate students in the Faculty of Architecture,  
or permission of instructor

### **PLAN 5201.00: Work Term.**

The work term is an integral academic part of the MURP programme. Before graduation, a student must complete fourteen weeks of employment in some aspect of the planning profession. Work placements are co-ordinated by the Co-op Co-ordinator for Architecture and must be approved by the Department.

RESTRICTION: MURP students

### **PLAN 9001.00: MURP Thesis.**

In the final term of the programme, each student must complete a written thesis. The thesis is guided by a committee which consists of one supervisor and at least one advisor, one of whom must be a full-time faculty member in the Department of Urban and Rural Planning. The thesis must conform to the standards described in "Guide for the Preparation of Graduate Theses", a manual issued by the Department. The student is also required to make an oral defence of the thesis.

RESTRICTION: MURP students

### **PLAN 9002.00: MEng/MURP Thesis.**

In the final term of the programme, 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 Department of Urban and Rural 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", a manual issued by the Department of Urban and Rural Planning, and must be accepted by the thesis committee and an external examiner approved by the two departments. The student is also required to make an oral defence of the thesis.

RESTRICTION: MEng/MURP students

### **PLAN 9003.00: MASc/MURP Thesis.**

In the final term of the programme, 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 Department of Urban and Rural 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", a manual issued by the Department of Urban and Rural Planning, and must be accepted by the thesis committee and an external examiner approved by the two departments. The student is also required to make an oral defence of the thesis.

RESTRICTION: MASc/MURP students

### **PLAN 9004.00: Continuation - MURP Thesis.**

Continuation of PLAN 9001.00.

RESTRICTION: MURP students

### **PLAN 9005.00: Continuation - MEng/MURP Thesis.**

Continuation of PLAN 9002.00.

RESTRICTION: MEng/MURP students

### **PLAN 9006.00: Continuation - MASc/MURP Thesis.**

Continuation of PLAN 9003.00.

RESTRICTION: MASc/MURP students.

# Women's Studies

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Location: 1461 Seymour St.  
Halifax, NS B3H 3J5  
Telephone: (902) 494-2980  
Fax: (902) 494-2105  
E-mail: wsma@is.dal.ca  
Website: <http://www.dalgrad.dal.ca>

## Women's Studies Coordinator

Tillotson, S.

## Graduate Programme Coordinator

Keddy, B.

## Inter-University Faculty

### Atlantic School of Theology

Davis Finson, S., BA (Waterloo-Lutheran), MRE (Emmanuel),  
MSW (Toronto), DMin (Boston)

### University of King's College

Glowacka, D., BA, MA (Wrocław), PhD (New York at Buffalo)

### Dalhousie University

Bankier, J., BA (Toronto), LLB (Osgoode)  
Barber, P.G., BA, MA (Auckland), PhD (Toronto)  
Bednarski, B., BA (London), MA (Dal), PhD (Laval)  
Campbell, S., BA, MA (Alberta), PhD (Toronto)  
Carbert, L., BA (Alberta), MA, PhD (York)  
Crowley, J., BA (Princeton), MA (Michigan), PhD (Johns Hopkins)  
Ginn, D., BA (MtA), LLB (Queen's), LLM (Osgoode)  
Jackson, L., BA, MA, PhD (Toronto)  
Jarman, J., BA, MA (Toronto), PhD (Cambridge)  
Keddy, B., BScN (MCSV), MA, PhD (Dal), RN  
Laidlaw, T., BA, Med (Calgary), PhD (Alberta)  
Luckyj, C., BA, MA, PhD (Toronto)  
Neal, R., BA/BSW (McMaster), MA (OISE), SSW  
Oore, I., BA (TelAviv), MA (Waterloo), PhD (Western)  
Parpart, J., BA (Brown), MA, PhD (Boston)  
Phipps, S.A., BA(Hons) (Victoria), MA, PhD (UBC)  
Richard, B., BA (Mt.A), MSW (Dal)  
Sherwin, S., BA (York), PhD (Stanford)  
Stone, M., BA (Guelph), MA (Waterloo), PhD (Toronto)  
Thomas-Bernard, W., BA (MSVU), MSW (Dal), PhD (Sheffield)  
Thompson, J., BA (Western), MA, PhD (Toronto)  
Thornhill, E.M.A., BA, DipEd (McGill), LLB (UQAM),  
DipInt'l&CompLaw (San Diego), MA (Montréal), LLD (City of  
NY), LLD (Concordia)  
Tillotson, S., BIS (Waterloo), MA, PhD (Queen's)  
van Roosmalen, E., BA (Waterloo), PhD (Alberta)

### Mount Saint Vincent University

Baker, P., BA (Manitoba), MA, PhD (Toronto)  
Bruhm, S., BA (MSVU), MA (Dal), PhD (McGill)  
Deleas, J., PhD (Montpellier)  
Early, F., BA (Florida State), MA, PhD (Concordia)  
Frank, B., BA, BEd, MEd (Acadia), PhD (Dal)  
Gordon, J., BA (Antioch), MA, PhD (S.Illinois)  
Mathieson, C., BA (Ottawa), BA (MacMurray), MA (Northern  
Arizona), MSc, PhD (Calgary)  
Medjuck, S., BA, MA (McGill), PhD (York)  
Neilsen, L., BEd (Sask), MA (Minnesota), PhD (New Hampshire)  
Norris, D., BHEc (MSVU), MSc (Alberta), CFLE (Minneapolis),  
PhD (Dal)  
O'Brien, M., BA (Mercyhurst), MA, PhD (Michigan)  
Ralston, M., BA (Toronto), MA (Sussex), PhD (Dal)  
Scrimger, J., BA (Guelph), DipEd, MA (Western)  
Side, K., BPE, BA (McMaster), MA (Kent), PhD (York)

Varga, D., BAsC (Guelph), MA, PhD (Toronto)  
Warne, R., BA (Winnipeg), MA, PhD (Toronto)  
Zuk, R., BA, MA, PhD (Alberta)

### Saint Mary's University

Bell, S.J., BA, MA (Western), PhD (Toronto)  
Boyd, S., BA (California), MASp (San Francisco), PhD (Simon Fraser)  
Cauville, J., MA (Paris), MA, PhD (UBC)  
Christensen-Ruffman, L., BA (Smith), PhD (Columbia)  
Crooks, S., BA (SMU), MA (Dal), PhD (Edinburgh)  
Dalton, A.M., BS, BEd (MUN), MA (Fordham), PhD (Cath. Univ. of  
America)  
Hulan, R., BA(Hons) (Acadia), MA (Guelph), PhD (McGill)  
Fitzgerald, P., BBA (StFX), MA (N.Dakota), PhD (N.Colorado)  
Katz, W., BA (Skidmore), MA, PhD (Dal)  
Keeble, E., BA (DePaul), MA, PhD (Dal)  
MacDonald, M., BA (Dal), MA, PhD (Boston)  
MacNevin, A., BSc, BEd, (MSVU), MA (Dal), PhD (Memorial)  
Ralston, H., RSCJ, BA, MA, PhD  
Tastoglou, E., MA, PhD (Boston)  
Thomas, G., BA, BEd, MA, PhD (Dal)  
Thomas, G., BA, MA (Sussex), PhD (London)  
VanderPlaat, M., BA, MA, PhD (Dal)

## I. Master of Arts in Women's Studies

This degree is offered jointly by Dalhousie University, Mount Saint Vincent University, and Saint Mary's University. The degree will be granted jointly by the three cooperating universities and each students' programme will be approved by the Joint Graduate Admissions and Programme Committee (GAPC). The MA in Women's Studies emphasizes the interdisciplinary basis of Women's Studies, its community linkage and the emerging body of feminist theories and methodologies. Drawing on the collective resource of faculty members across the three universities, the programme invites applications from students whose research interests fall within ten broad categories: feminist theory and methodology; women and work; gender and development; women and health; North American women's history; feminist literary/cultural theory and practice; gender and education; women and social change; women and sexuality; and lesbian/bisexual/queer studies.

### A. Admission Requirements

To be admitted to the MA, students normally will be expected to have completed an Honours BA or equivalent with a minimum of B average or equivalent. Admission will also be based on the availability of Women's Studies faculty to supervise in the student's proposed area of research. Some students may be required to do qualifying classes to develop their background in social sciences, humanities and/or Women's Studies prior to admission to the programme.

In addition to following normal university procedures for application to graduate programmes, students must submit transcripts, three letters of references, a Supplementary Application Form and a sample of writing.

Applications can be made to any of the three cooperating universities. Decisions in admission are made by the Interuniversity Graduate Admissions and Programme Committee (GAPC) for Women's Studies.

### B. Programme Requirements

The programme includes both class work and thesis and can be pursued either full time or part time. The normal time limits for the completion of MA degrees apply (please refer to the Faculty of Graduate Studies regulations). The programme requires a minimum of five credits (5.0) including three required half-credits (Theories of Feminism, Feminist Methodologies and Graduate Seminar) and a two-credit thesis. Remaining electives can be chosen from among a range of graduate-level classes offered by other departments at the three universities, in consultation with the students' faculty advisor.

## II. Classes Offered

### **WOST 6010.03: Theories of Feminism.**

This class provides an in-depth study of feminist theory. It explores the development of theories over time and across borders, focusing on common assumptions and debates among feminists.

### **WOST 6020.03: Feminist Methodologies.**

This class examines feminist critiques and strategies around knowledge and research methodologies. It explores historical and contemporary debates on important research issues.

### **WOST 6030.03: Graduate Seminar.**

(Half-credit, meets through both semesters.) This seminar will be used to discuss student research proposals and to provide a forum to integrate material from other classes. As part of this seminar, each student will be required to engage in field-based learning (i.e. community-based, developed in the context of each students programme).

### **WOST 6090.03: Directed Study in Feminist Theory and Methodology.**

### **WOST 6091.03: Directed Study in Feminist Literary and Cultural Theory and Practice.**

### **WOST 6092.03: Directed Study in Gender and Development.**

### **WOST 6093.03: Directed Study in Women and Social Change.**

### **WOST 6094.03: Directed Study in Women in History (North America)**

### **WOST 6095.03: Directed Study in Women and Work.**

### **WOST 6096.03: Directed Study in Women and Health.**

### **WOST 9000.00: Master's Thesis.**

## Centres and Institutes

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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**

**Director:** Renee Lyons, PhD

**Co-ordinator:** S. Crowell, MPA

The AHPRC was established in 1993 through a Centres of Excellence Award from Health Canada and the Social Sciences and Humanities Research Council of Canada. The Centre is a cooperative effort between the Faculties of Health Professions, Medicine and Dentistry, and the four Atlantic Departments of Health, with support from Health Canada, other government granting agencies and the private sector. The Centre conducts and facilitates health promotion research that influences policy and contributes to the health and well-being of Atlantic Canadians.

Examples of research projects include rural health and sustainability, healthy communities, midlife aging and environmental quality of schools.

The AHPRC provides assistance with the development of health related research ideas, offers advice and consultation on proposals and reports; helps with networking, advises on potential funding sources, offers letters of support, a regular newsletter, a Web site, a library of health promotion materials and workshops and seminars on health promotion research.

Opportunities exist for faculty members and students to participate in the Centre's projects and activities. Students can also become involved with the Centre as volunteers, through field placements and research internships.

### **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:** Chair, Department of Chemistry

**Manager:** D.L. Hooper, BSc, MSc, PhD

Established in 1982 with assistance from the Natural Sciences and Engineering Research Council, the Centre is concerned with teaching and research programmes in magnetic resonance. The Centre has modern nuclear magnetic resonance (NMR) and electron spin resonance (ESR) instruments including Bruker AC 250 and AMX 400 NMR instruments for solid state studies and for liquid samples.

In addition to providing well-equipped laboratories and instrumentation for resident and visiting faculty, research scientists and students, the Centre provides NMR spectra and expertise to scientists in the Atlantic Region.

### **Atlantic Research Centre**

**Director:** H.W. Cook, MSc, PhD

Established in 1967, the Centre conducts basic biomedical research in the fields of lipid metabolism and cell signalling and trafficking. It also provides education in these fields to undergraduate and graduate students and the general public. The Centre's staff hold appointments in the Departments of Pediatrics and Biochemistry and Molecular Biology in the Faculty of Medicine. Research at the Centre is supported by agencies such as the Canadian Institutes of Health

Research, NSERC, Heart and Stroke Foundation, Dalhousie Medical Research Foundation, IWK Grace Research Foundation and Glaxo-Wellcome.

### **Canadian Institute of Fisheries Technology (CIFT)**

Director: T.A. Gill, PhD  
Telephone: (902) 494-6030  
Fax: (902) 420-0219  
Website: [www.dal.ca/~cift](http://www.dal.ca/~cift)

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 Department of Food Science and Technology. Major areas of emphasis are: food biochemistry; fats, oils and nutraceuticals; physical properties of foods; fish/food process engineering; computerized control in the food processing industry; food safety and preservation; seafood toxins; 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, analytical and preparative electrophoretic/isoelectric focusing equipment, capillary electrophoresis system, universal texture testing machine, various colorimeters, U.V. and visible spectrophotometer, spectrofluorometer, electrokinetic analyzer, differential scanning calorimeter, controlled stress rheometer with a high temperature/pressure attachment, controlled rate rheometer, and a rolling ball viscometer.

#### **Educational Opportunities**

Undergraduate (BASC) and graduate (MSc and PhD) programmes are available through the Department of Food Science and Technology. 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 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**

Telephone: (902) 494-3814/3667  
Fax: (902) 494-2105  
Director: J.L. Parpart, MA, PhD

This Centre, established in 1975, advances instruction, publication, research and development education programmes 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 cooperates with the International Development Studies programme and with the Lester Pearson International Office.

### **Centre for Foreign Policy Studies**

Director: Timothy M. Shaw, 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](http://www.dal.ca/~centre).

### **Centre for International Business Studies**

Director: Mary R. Brooks, BOT, MBA, PhD

The Centre was established in 1975 and is funded by the Export Development Corporation. Its purposes include the provision of specialist training in international business studies, research and outreach activity in international business. It carries out these functions within the administrative framework of the School of Business Administration.

The Centre is very proud of its linkages with the local and regional business community. An annual Foreign Business Programme was begun in 1989-90; this MBA credit class matches students to Nova Scotian companies to conduct market investigations and assist companies in preparing to visit the market in the class of the programme. Intern programs also assist Atlantic Canadian companies who need more in-depth international market intelligence and offer the intern the opportunity to learn about international business by doing it. Fostering such future partnerships between students and business is a priority for CIBS.

## Centre for Marine Geology

Director: David B. Scott, BSc, PhD

The Centre for Marine Geology was founded in 1983 to promote the interdisciplinary study of the continental margins and the sea floor. The Centre draws on the faculty and resources of the Departments of Earth Sciences, Oceanography and Physics and has close links with other oceanographic institutions in North America. The objectives of the Centre are: (1) to expand the university's leading role in international studies of the oceanic crust, (2) to participate with industry and government in the geological aspects of oil and gas development on Canada's east coast and (3) to continue research on sedimentation and the recent history of the Canadian offshore.

## Centre for Marine Vessel Development and Research (CMVDR)

Director: C.C. Hsiung, PhD, PEng, CEng, FRINA, Professor of Naval Architecture, Former McConnell Chair of Engineering

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 Programme 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 Programme has sophisticated and networked Computer Systems to support its advanced research work. Computer systems used include Pentium PC's running under Linux and/or Windows 95/98/NT.

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.

## Centre for Water Resources Studies

Director: D.H. Waller, PhD, PEng

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, the computer modeling of hydrodynamic and hydrochemical processes, as well as topics in hydrogeology. In 1982 the Centre established the Halifax Urban Watersheds Program, a long-term study of a pair of watersheds near the Halifax city limits. This study focuses on the watersheds as a field laboratory for the study of the effects of urbanization on surface water quality and quantity. To better facilitate the development of relevant research programmes and the dissemination and application of research results, the Centre has memoranda of understanding with Environment Canada, the Nova Scotia Department of Environment, Fenwick Laboratories and the Dalhousie School of Resource and Environment Studies. 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 programme in this area since 1987. In addition to numerous field installations the Centre fully has functional laboratory installations that duplicate the behaviour of sloping sand filters and septic disposal. The Halifax Urban Watershed (HUW) is the outdoor laboratory used by the Centre for much of its research. The HUW consists of 15 m<sup>2</sup> of watershed area containing five lakes. The lakes vary in the amount of development within their watersheds, from completely undeveloped to completely developed and are, therefore, ideal for studying a variety of subjects related to urban areas. The HUW is located approximately five kilometers from campus and can be reached within ten minutes. This location makes it ideal for studies requiring frequent site visits.

### *Educational Opportunities*

The Centre encourages applications from qualified graduates with experience in engineering and science who have an interest in water resources research. Graduate programmes which are offered within the Faculty of Engineering include the Ph.D., Master of Applied Science, and Master of Engineering. The Centre also participates in the programme leading to a dual degree in water resources engineering and planning, in conjunction with the Department of Urban and Rural Planning into the Faculty of Architecture.

## Dalhousie Health Law Institute

Director: Jocelyn Downie, BA, MA, MLitt, LLB, LLM

Associate Director: Elaine Gibson, LLB, LLM

Associate: Fiona Bergin, BA, LLB, MD, LLM

Dalhousie University

6061 University Avenue

Halifax, NS B3H 4H9

Telephone: (902) 494-6881

Fax: (902) 494-6879

E-mail: hli@dal.ca

Website: www.dal.ca/law/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 delivery 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 the literature 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 students and health care professionals in training providing continuing education opportunities for health care 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.

### Minerals Engineering Centre

Director: Georges J. Kipourous, PhD, PEng

The Minerals Engineering Centre was established from the Laboratory for the Investigation of Minerals, formerly part of the Atlantic Industrial Research Institute. The Minerals Engineering Centre is intended to provide research, analytical and advisory services to industries, universities, and government bodies in Atlantic Canada. The Centre is located in G Building on Sexton Campus which also houses the Department of Mining and Metallurgical Engineering. 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, spectrophotometric 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

The Minerals Engineering Centre is closely linked with the Department of Mining and Metallurgical Engineering and 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: I.A. Meinertzhagen, DSc

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 parallels the establishment of many such institutes throughout the world and marks dramatic recent progress in understanding the workings of the brain.

Currently housed in the Sir Charles Tupper Medical Building, 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 programmes in neuroscience currently offered through its constituent departments at both the undergraduate and graduate levels. Associated with the latter it sponsors a seminar series annually.

### The Nova Scotia CAD/CAM Centre

Location: 1360 Barrington Street  
P.O. Box 1000  
Halifax, B3J 2X4  
Reception: 902 - 494 - 6035  
Fax: 902 - 422-8380  
Contact: Leigh Beauchamp Day, Business Development & Public Relations Manager  
902 - 494 - 6040

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". It has since expanded to include advanced composite-materials in bridges and structures and remote monitoring of innovative structures.

Director: Dr. Aftab A. Mufti, P.Eng.  
494-6034

Assist. Director: Dr. Jean-François Trottier, P.Eng.  
494-6039

Admin. Assistant: Kathleen Dempsey  
494-3242

#### Design Engineering & Manufacturing

CAD/CAM Engineer: Mr. Robert Warner, P.Eng.  
494-6096

- CNC application research
- Prototype development
- Equipment consultation
- Coordinate Measuring Machine Services
- Insertion Moulding
- CADkey and SmartCAM
- irregular forms
- variety of metals and advanced engineering materials
- solid modeling/3D design
- Design & fabrication methods advice
- Advisory Service for: flow analysis, mold design analysis, thermosets, thermoplastics, reinforced plastics, compression moulding, etc.

Mr. Warner also teaches Mechanical Engineering class MECH 4631.03 CAD/CAM, where Dalhousie students are introduced to manual CNC programming and SmartCAM.

#### Advanced Composite Materials (ACM) in Bridges and Structures

Research Engineering: Mike Mahoney, P.Eng. (494-6163)

Research Professional: Chris Barnes (494-3904)

ISIS Engineer: Dr. Javad Jalali, P.Eng.

Manager: Dr. John Newbrok, P.Eng.

- R&D in ACM with wood and concrete
- Finite Element research
- FE training
- CAE advisory service
- Trade Missions
- International Conference Organization
- Operates ACMRS Network
- Operates ISIS - Halifax

- fracture mechanics
- crack propagation
- bearing shaft design
- stress and impact problems
- construction: buildings, bridges, ships and aircraft
- composite and advanced materials
- innovative structures and remote monitoring of structures

#### ***Advanced Composite Materials in Bridges and Structures***

The Advanced Composite Materials in Bridges and Structures (ACMBS) Division was established in 1989 to serve a need in the engineering, design and construction industries with respect to the application of advanced composite materials in bridges and structures. The Centre works closely with the Advanced Materials Engineering Centre (AMEC) for their testing expertise.

#### ***Business Development & Public Relations***

Contact: Ms. Leigh Beauchamp Day, 494-6040

- Industry contacts
- Training coordination
- Seminar & event coordination
- Information dissemination
- Proposals & contracts
- Public Relations

#### ***Equipment & Software Available for Industry and Dalhousie Use***

- SmartCAM, ALGOR
- CNC milling centre Mori-Seiki MV Junior 3-axes
- CNC turning centre lathe Mori-Seiki SL-25
- Co-ordinate Measuring Machine (CMM), Mitutoya measuring range of 13" x 20" x 12"
- Impact testing machine Tinius Olsen Izod - Model 66
- "Roughness" measuring gage unit, Scarface finish
- CNC milling machine Easymill-3 2 ½ axes (for training purposes only)
- Injection Moulding Machine 25 Ton Engel 1.2 oz
- Manual try-out plastic injection press

#### ***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
- temporary transfer of staff to companies
- temporary transfer of company staff to the Centre
- access to specialized equipment and facilities
- an expansion of the items listed under Current Activities above

Supported by:

- The National Research Council Industrial Research Assistance Programme (IRAP) and Canadian Technology Network (CTN)
- ISIS Canada (NSERC)
- Canada/Nova Scotia Cooperation Agreement

#### **Trace Analysis Research Centre**

Director: L. Ramaley, BA, MA, 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 eight 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 programme of seeking out and examining alleged safety-related defects. The major portion of the programme is geared to relating injuries from vehicular-crashes to the injury-causing mechanisms or sources in vehicles. As such, results of accident 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 accident reconstruction, in data base management and modular analysis procedures, particularly in relation to injury severity and injury-causal factors.

# Resources and Services

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## 1. Alumni Association/Alumni Relations

The Alumni Association is comprised of over 76,000 graduates of Dalhousie University. A strong 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. Because of alumni leadership, Dalhousie enjoys a strong pool of applicants to its academic programs each year. Many alumni return to Dalhousie regularly to hire our graduating students. They also advance Dalhousie by serving 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 (494-2071/1-800-568-7403). 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.

## 2. Athletics

Athletics and Recreational Services offers a wide range of programmes for every Dalhousie student. An extensive programme of club and intramural activities offer fun, fitness and companionship while 13 varsity sports provide excitement for players and spectators alike. For those who prefer less competitive activities, there are a great number of fitness, leisure and aquatic instructional programmes.

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, and an indoor jogging track, a golf putting green and driving cage, and family-fitness features such as the Fun Zone play area (the largest indoor soft modular play structure in Metro) and our Family Change Room; the Dalhousie Memorial Arena, Studley Gym, and The F.B. Wickwire Memorial Field (one of the largest artificial playing surfaces in the world). The Cardio Fitness Centre, as well as a babysitting service, is 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, or the Intramural Office at 494-2049.

## 3. Black Student Advising Centre

The Black Student Advising Centre is available to assist and support new, prospective and returning Black Students (African, American, Canadian, Caribbean, etc.) The Advisor may organize programme activities which assist Black students in developing contacts with other Black students both on campus and in the Black community. The Centre is intended to foster a sense of support and community among the Black students, with other students and to increase intercultural awareness.

The Advisor will provide confidential services and programmes 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/or studying. Awards, scholarships, employment, community information and upcoming events are also made available.

The position of the Black Student Advisor was created by Dalhousie University to provide information to prospective students, increase access and promote retention of indigenous Black students.

The Centre may be beneficial to all students, faculty and staff as a means of increasing awareness and sensitivity to Black student issues and presence within the University community.

Kindly note that the Centre is a scent/fragrance-free environment.

For further information contact: Office - Black Student Advisor, Student Union Building, Halifax, Nova Scotia, B3H 4J2; phone - (902) 494-6648; fax - (902) 494-2042; World Wide Web homepage URL <http://is.dal.ca/~bsac>, E-mail: BSAC@Dal.Ca.

## 4. Chaplaincy at Dalhousie

The chaplains at Dalhousie provide confidential counseling on personal and spiritual issues and provide opportunities for prayer and worship, retreats, workshops and social outings. The Chaplains' office 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, Baptist, Christian Reformed, Jewish, Lutheran, 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 three brochures, "Dalhousie Chaplaincy Office: 2000-2001", "Religious Groups: What to Expect, What to Accept, and What to Avoid" and "Places of Worship At and Near Dalhousie".

Office hours are posted on the office door, room 437 on the fourth floor of the SUB. Our phone number is 494-2287. 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/chaplaincy](http://www.dal.ca/chaplaincy)

## 5. Continuing Technical Education Division

Dalhousie offers a variety of continuing education programmes for engineers, architects, computer scientists and other technical professionals. The administrative unit responsible for these activities is the Continuing Technical Education Division (CTE). The programmes offered include seminars, short classes and certificate programmes. Within the mandate of Dalhousie, the mission of CTE is to provide needs-driven, leading edge technical training and certificate programmes to the industrial and business community, government, defence personnel and technical professions.

Requests from Dalhousie Alumni to offer a larger variety of programmes closer to their homes led to the development of a national programme. CTE now takes an active role in offering continuing education training programmes across Canada.

CTE maintains a close liaison with business, industry, government, defence personnel and technical professions to ensure training needs are being met now and for the future.

For further information on our programs, contact the Director, Carol Connor at (902) 494-3208.

## 6. Counselling and Psychological Services

The Counseling and Psychological Services Centre offers programmes for personal, career and educational concerns. Counseling is provided by professionally trained Counselors and Psychologists. Strict confidentiality is ensured. Counseling is available both individually and on a group basis. Topics covered by regularly offered group programmes include Study Skills, Career Decision Making, What to do with a Degree in . . . , Exam Anxiety Reduction, Public Speaking Anxiety Reduction, Solutions for the Loss of a Relationship, Overcoming Procrastination, Anger Management, Resume Writing and Job Search Skills. Information on a wide variety of careers and academic programmes is available in the Frank G. Lawson Career Information Centre. The Internet, CD-ROMS,

audiotapes and videotapes, 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 Counseling and Psychological 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 three evenings 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 programmes, workshops, and speakers is available on the Dalhousie Counselling and Psychological Services web site.

## 7. DalCard

The DalCard (also referred to as the Dalhousie University ID Card or Campus 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; for printing at the Academic Computer labs in the LSC, Killam Library, Weldon Law Building, and School of Business; in addition it is a library card, a Dalplex membership and access card, and a residence meal plan 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 DalCard.

The DalCard Office is located in the University Food Service Office, Lower Level of Howe Hall, facing the Killam Library. The Registrar's Office, located in the Arts & Administration Building issues the DalCard to all students on the Studley and Carleton campuses. Students on the Sexton campus may obtain the DalCard at the Student Services Centre, A Building, 1360 Barrington Street. Employees may obtain a DalCard at the DalCard office or at the Student Services Centre on the Sexton campus.

## 8. 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 programmes.

Further information on the Music and Theatre Departments can be found in their separate listings.

## 9. 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 exclusively operated 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, a Housing Board, 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 and is open from 8:30 a.m. to 4:30 p.m. Monday through Friday, phone number 494-1106.

## 10. Housing/Residence Services

For the 55 per cent of Dalhousie University students whose homes are outside the Halifax Metropolitan area, where to live while attending university is a major question. The supply of University owned housing does not meet the demand and the vacancy rate in the various private, commercial units is low. It is therefore very important that students planning to attend Dalhousie think well in advance about their accommodation needs.

Students should be aware of the following points in reference to residence accommodation. You must indicate your interest in residence accommodation on your Application for Admission to a programme of study. Upon admission to a programme of study, those students who have indicated an interest will receive a Residence Application Form. It is important to return the Residence Application Form promptly as the applications will be considered as they arrive. Residence Application Forms will not be distributed to, nor received from, individuals who have not gained admission to a programme of study.

Students with disabilities are encouraged to contact the Residence Office at (902) 494-1054, or e-mail: [housing@dal.ca](mailto: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, 3. off-campus housing owned by the university, 4. the services offered by the off-campus housing office listing service and 5. general information. For information on housing fees, see the Fees section of the Calendar.

PLEASE NOTE: Academic acceptance by the University, i.e., admission to a course of study, DOES NOT GUARANTEE admission to University Housing or provision of off-campus accommodation.

It is the responsibility of the individual student in all cases to make separate application for the university housing of her/his choice, or to avail him/herself of the listing services provided by the Off-Campus Housing Office.

As available space in University residences is limited students are encouraged to complete and submit their residence application immediately upon receiving it with their letter of academic admission.

### 1. Traditional Style On Campus Residence

#### A) Main Campus

##### i) Howe Hall

Centrally located on campus, Howe Hall, provides accommodation for 524 undergraduate students. The sprawling, grey ironstone complex is divided into five houses: Bronson, Henderson, Smith and Studley Houses are co-ed; Cameron is for men only. Each house has its own distinctive identity and student government. The ratio of seniors to first-year students is approximately 35/65, except in Henderson house which is predominantly for first year students.

The houses offer both double and single rooms with the singles generally reserved for senior undergraduates and the 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 ResNet (see below).

ii) Shirreff Hall

The women's residence on the Dalhousie campus, Shirreff Hall, provides accommodation for 444 female students. Located in a quiet corner of the campus, it is minutes from classes, the library, Dalplex and other facilities as well as from the scenic Northwest Arm. It is divided into three houses - Newcombe, Old Eddy and New Eddy (which includes the Annex). Old Eddy and New Eddy have both single and double rooms while Newcombe has single rooms only. The Annex houses only 14 senior students and is distinct from the remainder of Shirreff Hall in that it has a separate outside entrance and is not directly accessible from the main residence.

Shirreff Hall offers a dining room, an elegant library and visitors' lounge, study areas, computer rooms, games room, television lounges, exercise room, kitchenettes, canteen, laundry room, reception desk, and ResNet (see below). Students 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 84 students in predominantly single rooms.

This three-storey building is located close to the Dalplex and to Shirreff Hall, where students take their meals. Facilities include study rooms, a multipurpose room, reception area, laundry facilities, leisure lounges with kitchenettes and ResNet (see below).

B) Sexton Campus

i) O'Brien Hall

M.M. O'Brien Hall is centrally located at the corner of Morris and Barrington Streets. Unlike many modern University residences, this seven storey brick building is small and exudes an atmosphere of friendliness. Accommodation is available for 130 students. Each residence floor includes, two large washrooms, twelve single, five double rooms, one RA's room, and access to ResNet (see below). The main floor has a T.V. lounge, student dining hall and kitchen facilities.

*ResNet connects your personal computer to the Dalhousie campus network, the Internet, e-mail, etc. All residence rooms are wired for ResNet except residence houses which are under review. Information on applying and costs of installation will be provided to students offered accommodation.*

## 2. Non-Traditional On-Campus Housing

### A) Main Campus

i) *Glengary Apartments*

Located on the campus on Edward Street, Glengary Apartments is a four-storey brick building offering co-ed accommodation for 40 students. Preference is given to students in second and third year and 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 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 is available 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.

ii) *Residence Houses*

Dalhousie also has four residence houses, two of which are co-ed. All were once single family homes, and have their own kitchens, living rooms and bathrooms. The character of these homes has been maintained as much as possible. The houses are all on

campus. Although they are generally occupied by students in graduate programmes or professional schools, a few of the 31 spaces are reserved for undergraduates.

Two of the houses are designated as 24-hour quiet areas for students who want a particularly quiet environment in which to live and study.

All of these houses have both single and double rooms, each with a bed, dresser, study desk, lamp and chair. Linen, cooking utensils and small appliances are not provided. Students share kitchen and living room areas. A trained senior student acts as a house assistant and liaises with the Howe Hall Residence Life Manager and Facility Co-ordinator to provide administrative and resident-related services. ResNet is *not* available in the residence houses.

### B) *Sexton Campus*

i) *Graduate House*

This facility houses 14 graduate students, all in single rooms, and is located beside O'Brien Hall. Rooms are wired for ResNet. ResNet connects your personal computer to the Dalhousie campus network, the Internet, e-mail etc. Information on applying and costs of installation will be provided to students offered accommodation.

Two options are available to graduate students. They are:

- 1) Room with meal plan;
- 2) Room without meal plan.

## 3. Off-Campus, University-Owned Housing

### C) *Fenwick Place*

Dalhousie's 33-storey Fenwick Place offers students the privacy and some of the independence of apartment living. Located in south end Halifax, it is only a 15-minute walk or a short bus ride from the campus. Fenwick houses both single and married students 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 and 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, electricity, and satellite television are included in the residence fee.

Fenwick also has a number of unfurnished bachelor, one and two-bedroom apartments which are rented to married and single students. 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.

## 4. 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 the Student Union Building, this office is designed to help students find privately-owned 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.

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 low vacancy rate in Halifax, it is advised that students start looking for off-campus housing well ahead of the academic year.

## 5. General Information

- Application forms must be accompanied by an application fee and a deposit in Canadian funds, payable to Dalhousie University. Deposit amounts are listed on the application form.
- Acceptance into an academic programme does not mean that application for a place in residence has been approved.
- 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 additional copies of the residence application form, do not hesitate to contact:

### Director of Housing, Conference and Ancillary Services

Location: 6250 South Street  
Dalhousie University  
Halifax, N.S. B3H 3J5  
Telephone: (902) 494-3365

### Howe Hall, Eliza Ritchie Hall, Shirreff Hall and the Residence Houses:

Location: Residence Office  
Howe Hall  
Dalhousie University  
6230 Coburg Road  
Halifax, N.S. B3H 4J5  
Telephone: (902) 494-1054  
E-mail: housing@dal.ca  
Website: <http://www.dal.ca/housing>

### For Fenwick Place, Glengary Apartments, O'Brien Hall, Graduate House:

Location: Accommodation Office  
Fenwick Place  
Dalhousie University  
5599 Fenwick Street  
Halifax, N.S. B3H 1R2  
Telephone: (902) 494-2075  
E-mail: housing@dal.ca  
Website: <http://www.dal.ca/housing>

### For Off-Campus Housing Assistance:

Location: Off-Campus Housing Office  
Student Union Building  
Room 407  
Dalhousie University  
6136 University Avenue  
Halifax, N. S. B3H 4J2  
Telephone: (902) 494-3831  
E-mail: och@dal.ca  
Website: <http://www.dal.ca/och>

### ResNet:

Location: Dalhousie University  
6250 South St.  
Halifax, NS B3H 3J5  
Telephone: (902) 494-3365  
E-mail: [resnet@dal.ca](mailto:resnet@dal.ca)

## 11. Instructional Development and Technology

The Office of Instructional Development and Technology (OIDT) is mandated to initiate, lead, and coordinate activities which encourage reflection upon and improvement in teaching and learning at Dalhousie.

**Programming:** To fulfil this primary goal, OIDT organizes a range of programming for faculty and teaching assistants. A series of weekly or bi-weekly workshops, presentations, and demonstrations are scheduled to address the full spectrum of instructional issues, including curriculum design, evaluation, active learning strategies, and the effective integration of Instructional Technology. All workshops are open to the full Dalhousie Community. Annual events include the Celebration of University Teaching lecture and reception, which honours Dalhousie's many teaching award winners. OIDT also organizes several university-wide teaching awards, including the Dalhousie Instructional Leadership Award, the Alumni Award of Excellence

for Teaching, and the President's Graduate Teaching Assistant Award. The annual Dalhousie Conference on University Teaching and Learning brings together presenters from across the University and the country to explore issues related to specific themes. OIDT also oversees the Mentoring at Dalhousie initiative for new faculty members, and is responsible for the assessment of the University's Career Portfolio and Skills Transcript projects.

**Publications - Focus on University Teaching and Learning,** the OIDT newsletter, is published five times a year. Three other publications - Recording Teaching Accomplishment: A Dalhousie Guide to the Teaching Dossier; University Teaching and Learning: An Instructional Resource Guide for Teaching Assistants at Dalhousie University; Learning Through Writing: A Compendium of Assignments and Techniques are available in pull-text versions on the OIDT website ([www.dal.ca/oidt](http://www.dal.ca/oidt)) and may be purchased or borrowed from the OIDT. The extensive bibliography of materials available for loan includes both print and video resources on topics related to teaching. These may be borrowed by faculty, teaching assistants, and students.

**Instructional Media Services:** To complement its primary goal, the OIDT also has responsibility for the Instructional Media Services unit which provides support to the university community in a number of areas. Audio-visual Classroom Services provides a wide range of equipment for use on the Studley campus, classroom equipment installation, and training and consultation in the use and development of instructional materials. Graphics Services offers consultation, professional production, and output services for print and presentation media and display items. They design, layout, and produce brochures, newsletters, books, forms, stationery and business cards, posters, books, charts, graphs, maps, and banners. Video and Audio Production Services provides a range of video and audio recording services to students, faculty, and staff, including consultation, scripting, shooting and editing of video, television, and world wide web productions; on-location video and audio recording, mixing, and editing; videotape duplication; and related graphics and photography. Photography Services include digital imaging (scanning, output to prints & slides, etc.), photomicrography, scientific imaging, as well as general photographic services like portraiture and event photography, film processing, special effects duplication, and the creation of photographic displays. The Learning Resource Centre (LCR) is equipped with a variety of resources for faculty and students to review non-print instructional materials (video or audio tapes, CD-ROMs, etc.). In addition to PC and Macintosh computers, there are VCRs and monitors, audio cassette players, as well as technical and software support for language instruction. The LRC also offers audio and video tape duplication and has a lending library of audio and video course materials. Technical Services repairs electronic equipment and provides a preventative maintenance service.

**Distance Education:** OIDT also supports the development of distance education courses, and maintains an information website for students and faculty ([www.dal.ca/de](http://www.dal.ca/de)). Information about Distance Education courses is also available from the Registrar's Office.

Information, teaching resources, and private consultations are available through the central Office of Instructional Development and Technology, located in the Killam Library Courtyard (494-1622), ([OIDT@is.dal.ca](mailto:OIDT@is.dal.ca)).

## 12. International Student Advisor

International Student Services (ISS) at Dalhousie University fosters cross-cultural understanding within the university and Halifax community. Provides ongoing support to the university's international students, helping them to make a smooth transition as they become familiar with their new university and surroundings, and providing continued advice and support throughout the duration of their academic programme.

The International Student Advisor provides services and programmes for students from around the world, serves as a resource for international students, and is dedicated to insuring that international students make the most of their stay in Canada. This includes the provision of information and advice on financial, legal, immigration and personal matters, and referrals to other services on campus. The Advisor organizes orientation programmes that assist

international students in adjusting to a new culture and in achieving their educational and personal goals. A variety of social, cultural and educational programmes are also held throughout the year.

The main office of International Student Services is located on the Studley Campus at Lester Pearson International (LPI), 1321 Edward Street, Halifax, NS, telephone (902) 494-1735. There is also an office located on the Sexton Campus at the Student Service Centre, Main Entrance, 1360 Barrington Street, Halifax, NS, Telephone (902) 494-6047. The International Student Advisor will meet with students at either location.

### 13. 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 programmes and projects at Dalhousie. In 1994, LPI's mandate was expanded to include a broader responsibility for international activities and for providing leadership in the internationalization of 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; facilitates and supports Dalhousie's student exchange programs; provides services to Dal's international students; coordinates a development education programme entitled DAL-Outreach which organizes seminars and events; serves as the university's International Liaison Officer (ILO) and disseminates information concerning international activities and opportunities; hosts official international visitors and helps to facilitate the visits of international scholars; and provides meeting space to international-oriented groups. 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 at 1321 Edward Street (on the corner of University Avenue).

### 14. Libraries

The Dalhousie University Library System is organized to accommodate the needs of the undergraduate teaching programmes, 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, Computer Science, and Engineering.

As of April 1, 2000, the total Dalhousie University Library System holdings include over 1,760,000 volumes of books, bound periodicals, documents, and bound reports, 496,000 microfilm & microfiche, 100,000 maps, and other media. Approximately 9,000 serials titles are currently received.

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.

### 15. Ombudsperson's Office

The Dalhousie Ombudsperson's Office 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 Ombudsperson's Office, and all inquiries are strictly confidential.

The Dalhousie Ombudsperson's Office is located in the Student Union Building, Room 441. Regular office hours are posted on the door at the beginning of each Semester. The Ombudsperson's Office can also be reached by calling 494-6583. If no one is available to take a call, a message may be left on voice mail.

### 16. 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 programmes. 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 programmes or to the office of Student Services or to specific service areas such as the Counseling Services Centre. The Registrar's Office also mails tens of thousands of letters and packages annually in response to information requests and for 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 summer advising programme for first year students in Arts and Social Sciences, Management, Computer Science, Engineering, Computer Science and Science is directed from the Registrar's Office. Prospective students may arrange a tour of the campus through this office.

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 Arts & 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 A 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  
E-mail: Registrar@dal.ca

### 17. Services for Students with Disabilities

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, TTY (902) 494-7091, or by e-mail (disabilities@dal.ca). Please refer to our website for further information: <http://www.dal.ca/~services/ssd.html>

*Please note that due to chemical sensitivities of persons who work and frequent this office, our environment must be scent free.*

### 18. Sexual Harassment Resource Group

Sexual harassment, in general terms, is unwelcome, sexually oriented attention of a deliberate or negligent nature. It can adversely affect one's working or learning environment or participation in University life. It is a form of discrimination on the basis of sex, gender and/or sexual orientation and is prohibited by the Nova Scotia Human Rights Act. Sexual harassment can take many forms including, but

not limited to, comments, jokes or insults about a person's gender, sexual orientation or appearance; leering or suggestive looks; displays of offensive pictures or materials; unwanted sexual propositions or demands; persistent unwanted contact after the end of a relationship; and unwanted physical or sexual contact. It may involve promises of reward for complying with sexual demands or threats of reprisals for failing to comply with such demands. It can also create a uncomfortable environment in which to work, live or study through continued sexual comments, suggestions or pressures.

Dalhousie University is committed to an environment free from sexual harassment and has policy and procedures in place to deal with concerns. This policy can be found on the Dalhousie web page at <http://www.dal.ca/sexualharassment/> and copies are available from members of the Sexual Harassment Resource Group and the Sexual Harassment Officer.

If you feel that you are being harassed, whether by a professor, teaching assistant, staff member, co-worker, student or client, talk to someone. Sexual harassment usually does not go away if you ignore it. If you are able, tell the person as clearly, firmly and directly as you can that the behaviour is unacceptable and that you want it to stop immediately. If this does not stop the behaviour or if you are unable to communicate your concerns (for fear of reprisal or concerns for your safety and comfort), it is time to seek help. The Sexual Harassment Resource Group and Sexual Harassment Officer provide advice, information and support to everyone involved in a concern. Contact information for members of the Sexual Harassment Resource Group is distributed regularly throughout the University community and is also available from the Sexual Harassment Officer.

Contact: Susan Brousseau, Sexual Harassment Officer  
Where: Room 2, Basement Level, Arts and Administration  
Building, Studley Campus  
Phone: 494-1137, 494-1658 (fax)  
E-mail: [susan.brousseau@dal.ca](mailto:susan.brousseau@dal.ca)  
Website: <http://www.dal.ca/sexualharassment/>

## 19. 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 440  
Dalhousie Student Union Building  
Telephone: (902) 494-2205  
E-mail: [dsas@is2.dal.ca](mailto:dsas@is2.dal.ca)  
Website: [is2.dal.ca/~dsas](http://is2.dal.ca/~dsas)

## 20. 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 web page at [www.thedsu.com](http://www.thedsu.com). 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.

## 21. Student Employment Centre

The Dalhousie Student Employment Centre assists Dalhousie students in their efforts to obtain permanent, summer, or part-time employment. Positions are displayed at the Centre and on our web site: [www.dal.ca.sec](http://www.dal.ca.sec). The Centre is located on the fourth floor of

the Student Union Building, and operates Monday through Friday from 9:00 a.m. to 4:30 p.m. Telephone: (902) 494-3537, E-mail: [student.employment@dal.ca](mailto:student.employment@dal.ca). The Employment Centre also has useful information on resume preparation, interview techniques, and job-search skills as well as reference materials about international opportunities and recruiting companies. Interviews for graduating students are arranged with employers who visit Dalhousie each year (mid-October to mid-November are usually the busiest months).

Summer employment listings are received as early as October, while new part-time jobs are posted daily for both on campus and off campus locations. The Centre promotes Dalhousie students to employers nationally and internationally and follows the guidelines for ethical recruitment of the Canadian Association of Career Educators and Employers.

## 22. Student Services

Located at 1234 LeMarchant Street, 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 Athletics and Recreational Services; Bookstore; Career Portfolio Program; Counselling and Psychological Services; Health Services; Housing, Conference and Ancillary Services; International Student Services; Office of the Ombudsperson; Registrar's Office; Student Service Centre; Summer Orientation; University Food Services; Writing Workshop; and Student Resources including Black Student Advising, Advising to Students with Disabilities, Chaplaincy, Student Employment Centre, Student Volunteer Bureau and Tutoring Service.

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.

## 23. Student Volunteer Bureau

The Dalhousie Student Volunteer Bureau, a service of the Student Employment Centre, acts as a link between students looking for volunteer opportunities and a broad range of campus and community organizations. Students' skills, interests, and academic field can be matched with volunteer positions in more than 200 organizations throughout Metro Halifax. Overseas information and a resource library are also available. The Fall Volunteer Fair brings dozens of community organizations to the campus to inform students of current volunteer opportunities. The Bureau is open to any interested university student. The Volunteer Bureau is located on the fourth floor of the SUB.  
Email: [student.volunteer@dal.ca](mailto:student.volunteer@dal.ca)

## 24. Tutoring Service

The Dalhousie Tutoring Service, a component of the Student Employment Centre, provides subject tutoring to students requiring academic assistance. Tutors are senior baccalaureate and masters scholars at Dalhousie. The service is available throughout the year to clients studying at university as well as pupils from the surrounding community in public and private schools. Tutoring assistance is also provided to applicants to professional schools. The Tutoring Service is located on the fourth floor of the SUB. E-mail: [tutoring.service@dal.ca](mailto:tutoring.service@dal.ca).

## 25. 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, jewellery, 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 2000 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 at 1360 Barrington Street (Building A) and is open from 9:00 a.m. - 5:00 p.m. Monday to Friday (year-round). It supplies texts and reference books required for Architecture and Engineering students as well as crested clothing, stationery and other supplies.

## **26. 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. It is responsible for all centrally managed computing and communications facilities.

UCIS manages a campus-wide communications network which interconnects office systems, laboratory systems, departmental computers, and central facilities. This network is connected to the CA\*net3 research and education network and to the worldwide Internet. Network connections are available in some residence rooms, through Eastlink Cable, and via modems. UCIS is also responsible for University telephones.

Central computer systems include three IBM RS/6000 computers which are used primarily for academic purposes; an IBM RS/6000 SP2, which is a powerful parallel processing system used for research; and several IBM RS/6000 computers supporting the university's central administrative systems. In cooperation with the relevant academic departments, UCIS also supports numerous micro computer teaching laboratories which are situated throughout the campus, including laboratories in the School of Architecture, School of Business, Engineering, English, History, Sociology, Law, Music, Political Science, Physics, Biology, Earth Sciences, Dentistry, Psychology, and the Computer Centre in the basement of the Killam Library. It is strongly recommended, however, that students have access to a personally owned microcomputer with Internet access, especially for word processing, personal e-mail and WWW use, as most university facilities are heavily used for discipline-specific class work.

All students may have access to campus computing facilities on an individual basis or in conjunction with the classes that they take. Network ports for personally used computers are available in several campus locations, and also in rooms of several university residences.

UCIS also manages the campus computer store (PCPC); provides short, non-credit computer related classes in conjunction with Henson College, offers a hardware maintenance service for micro-computers, operates an online class delivery service (WebCT) and a web authoring service.

UCIS Help Desks are operated in the Computer Centre basement of the Killam Library, and in B Building, Sexton Campus, ground floor, adjacent to the Student Service Centre.

## **27. University Health Services**

The university operates a medical clinic, in Howe Hall, at Coburg Road and LeMarchant Street staffed by family doctors and two psychiatrists. 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. In the event of emergency, students should telephone the University Health Service at 494-2171. The university provides 24 hour on call emergency service.

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, should contact and advise the Health Service; preferably with a statement from the doctor.

## **28. Writing Workshop**

The Writing Workshop programme recognizes 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.

This English language resource centre offers non-credit classes in language and writing, including instruction and practice in English for speakers of other languages (ESOL), a tutorial service, guidelines for acceptable standard language usage, and provides information about sources for reference. For more information about the Writing Workshop, please call 494-3379 or visit our Website: [www.dal.ca/~workshop](http://www.dal.ca/~workshop).

# Financial Aid

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PLEASE NOTE: The contents of this section are subject to change without notice.

The University reserves the right to publicize the recipients of merit awards.

## I. Government Student Loans

### Canada Student Loans Plan

Canadian students, other than Quebec residents, are to apply for government assistance to the appropriate agency in that province or territory in which the applicant is a bona fide resident. The addresses for Canada Student Loan authorities of those provinces and territories participating in the plan are listed below:

#### Alberta

Alberta Students' Finance Board  
10th Floor, Baker Centre  
10025-106 Street  
Edmonton, Alberta T5J 1G7  
(403) 427-2740 Fax: (403) 422-4516

#### British Columbia

Student Services Branch  
Ministry of Advanced Education, Training and Technology  
2nd Floor, 1106 Cook Street  
Victoria, British Columbia V8V 3Z9  
(604) 387-6100/6101 Fax: (604) 356-9455

#### Manitoba

Student Financial Assistance Branch  
Manitoba Education and Training  
Box 6, 693 Taylor Avenue  
Winnipeg, Manitoba R3M 3T9  
(204) 945-6321/6322 Fax: (204) 477-4596

#### New Brunswick

Student Services Branch  
Department of Advanced Education and Training  
P.O. Box 6000  
Fredericton, New Brunswick E3B 5H1  
(406) 453-2577 or  
1-800-667-5625 (Atlantic Provinces, Ontario and Quebec only)  
Fax: (506) 444-4333

#### Newfoundland

Department of Education  
Student Aid Division  
Thompson Student centre  
Memorial University of Nfld.  
St. John's, Newfoundland A1C 5S7  
(709) 729-4235/5849 Fax: (709) 729-2298

#### Northwest Territories

Manager, Student Services  
Department of Education  
Government of the Northwest Territories  
Yellowknife, Northwest Territories X1A 2L9  
(403) 873-7190 or 1-800-661-0793 Fax: 1-800-661-0893

#### Nova Scotia

Student Aid Office  
Department of Advanced Education and Job Training  
P.O. Box 2290, Station M  
Halifax, Nova Scotia B3J 3C8  
(902) 424-8420 (metro)  
1-800-565-8420 (within province)  
Fax: (902) 424-0540

(Street location: Trade Mart Building, 2021 Brunswick at Cogswell Street, Halifax, N.S.)

#### Ontario

Student Support Branch  
Ministry of colleges and Universities  
P.O. Box 4500  
Thunder Bay, Ontario P7B 6G9  
(807) 343-7260 Fax: (807) 343-7278

#### Prince Edward Island

Student Aid Office  
Department of Education & Human Resources  
P.O. Box 2000  
Charlottetown, Prince Edward Island C1A 7N8  
(902) 368-4640 Fax: 9902) 368-4663

#### Saskatchewan

Student Financial Assistance Branch Saskatchewan Education  
1855 Victoria Avenue  
Regina, Saskatchewan S4P 3V5  
(306) 787-5620 Fax: (306) 787-7537

#### Yukon Territory

Students' Financial Services  
Department of Education  
P.O. Box 2703  
Whitehorse, Yukon Territory Y1A 2C6  
(403) 667-5310 or (403) 667-5929 Fax: (403) 667-6339

The above authorities also administer provincial bursary and loan plans in conjunction with the Canada Student Loan, if applicable.

#### Québec

Residents of Québec apply to:  
Ministère de l'enseignement supérieur et de la Science  
Direction générale de l'aide financière aux étudiants  
1033, rue de la Chevrotière  
Québec, Québec G1R 5K9  
(418) 646-5245

Leave brief message, your name, your Code Permanent, and the day/time period you will be "home". Québec will telephone the student back at that time period.

(514) 864-4505 (24-hour automated service)  
Fax: (418) 528-0648

## II. Dalhousie Graduate Bursaries

Students who find themselves in financial difficulty due to unforeseen expenses may apply for Dalhousie Graduate Bursary funds. Applications are available from the Faculty office and completed forms may be submitted to that office at any time.

All graduate students currently registered in a degree programmes beyond year one are eligible to apply.

### A. General Information about Bursaries

It should be noted that Canada Student Loans (with or without provincial bursaries and/or loans) are expected by provincial authorities to meet the financial deficiencies of the students and that 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 programme.

### 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.

# Fees

## Student Accounts Office

Mailing Address: Arts and Administration Building (Room 29)  
Halifax, NS B3H 4H6  
Service Location: Studley Campus - Basement A&A Bldg.  
Sexton Campus - Student Service Centre  
Telephone: (902) 494-3998  
Fax: (902) 494-2848  
E-mail: Student.Accounts@Dal.Ca  
Office Hours: Monday to Friday 10:00 a.m. - 4:00 p.m. (or by appointment)

2001/2002 Important Dates:	
September	
21	Fees due for fall term Last day to pay without late registration fee
October	
30	\$50 reinstatement fees assessed on all outstanding accounts over \$200
November	
5	Last day for partial refund fall term
January	
21	Fees due for winter term and second instalment of regular session Last day to pay without late registration fee
March	
1	\$50 reinstatement fee assessed on all outstanding accounts over \$200
8	Last day for partial refund for winter term
NOTE: Please consult Summer School Timetable for registration schedule for Summer School.	

## Website and Online Payments

[www.dal.ca/studentaccounts](http://www.dal.ca/studentaccounts)

## I. Introduction

The following section of the Calendar outlines the University Regulations on academic fees for both full-time and part-time students enrolled in programmes of study during the fall, winter and summer terms. A section on University residence and housing fees is also included. Students wishing to register for the Summer term should consult the Summer School Calendar for information on registration dates and fees.

All fees are subject to change by approval of the Board of Governors of Dalhousie University. An Academic Fee Schedule will be available with the registration package. A list of miscellaneous fees is included in Table I.

*NOTE: The student tuition fees and other fees that are published herein are applicable only to regular students admitted to a programme through the normal application process. Other students who are admitted to Dalhousie under a special programme or policy will be charged different tuition and other fees in accordance with such special programme or policy. For further information regarding any fees to be charged to students who are admitted to Dalhousie under a special programme or policy, please contact Student Accounts or the Dean's Office of the applicable faculty.*

Students should make special note of the academic dates contained in the front section of the calendar as well as fee dates. Students should also be aware that additional fees and/or interest will be charged when deadlines for payment of fees as contained herein are not met.

All the regulations in this section may not apply to Graduate Students. Please refer to the "Faculty of Graduate Studies" section of the Graduate Studies Calendar.

## II. University Regulations

The following general regulations are applicable to all payments made to the University in respect of fees.

- Fees must be paid in Canadian funds by cash, interact, negotiable cheque, money order, Mastercard, or Visa.
- If payment is by cheque and returned by the bank as non-negotiable, there will be an additional fee of \$20.00 and the account will be considered unpaid. Furthermore, if the bank returns a cheque that was to cover payment of tuition, the student's registration may be canceled and, if permitted to re-register, a late fee will apply.
- The receipt obtained from Student Accounts each time a payment is made will show the date and amount of the payment.
- Cash, interact, certified cheque, money order, Mastercard, or Visa is required for payment of any account in arrears beyond the current academic year.

### A. Deposits

#### i) Admission Deposit - Limited Enrolment Programmes

Admission deposits in limited enrolment programmes will be considered to be the registration deposit.

A non-refundable deposit of \$200.00 is required by all new students in Specified Limited Enrolment Programmes within three weeks of receiving an offer of a place at Dalhousie.

#### Limited Enrolment Programmes include:

- Master of Business Administration
- Master of Environmental Studies
- Master of Library and Information Studies
- Master of Public Administration

All programmes in the following faculties:

- Faculty of Dentistry
- Faculty of Health Professions
- Faculty of Law
- Faculty of Medicine

#### ii) Registration Deposits

Details on class selection, deposits, and payment will be included in the registration material.

### B. Registration

A student is considered registered only after financial arrangements have been made with Student Accounts (i.e. a deposit has been paid as noted above).

The completion of the registration process shall be deemed to be an agreement by the student for the payment of the balance of fees unless written notification to withdraw is submitted to the Office of the Registrar. Students withdrawing in person must attend the Office of the Registrar and the Student Accounts Office before the withdrawal process is official. Students in Graduate and Professional programmes wishing to withdraw should initiate formal action to withdraw at the Dean's Office of the appropriate faculty.

### C. Late Registration

Students are expected to register on or before the specified registration dates. Students wishing to register after these dates must receive the approval of the Registrar. A late registration fee of \$50.00 will apply if registration and payment of fees has not been completed by specified dates. This fee is payable at time of payment and will be in addition to regular fees.

## APPROVED TUITION FEES 1999-/2000

(The tuition fees for 2000/2001 have not yet been approved and will be available in the registration material sent at a later date.)

DEGREE PROGRAMME	PROGRAMME FEE	PER TUITION HOUR
Architecture		154
Arts and Social Sciences		135
Computer Science		154
Dentistry		
Dentistry	6,670	
Dental Hygiene	5,055	
Engineering		154
Health Professions		
Health Services Administration		154
Nursing & Kinesiology		158
Occupational Therapy, Physiotherapy & Pharmacy	5,854	
Recreation & Health Education		158
Social Work		150
Law	5,625	
Management		
Commerce Co-Op (Years 1, 2, and 4)		155
Commerce Co-Op (Year 3)		155
Management & Public Administration		136
Medicine		
MD	6,670	
Post-Graduates	1,680	
Science		154
<b>GRADUATE</b>		
<b>Masters</b>		
Architecture		
MArch (Post-Professional)	4,875	
MArch (First Professional, Year 1)	5,670	
MArch (First Professional, Year 2)	4,170	
Urban and Rural Planning		172
Arts and Social Sciences	4,290	
Computer Science	4,875	
Dentistry	6,930	
Education	3,720	
Engineering	4,875	
Health Professions		
Health Education, Leisure Studies	4,875	
Health Services Administration		164
Human Communication Disorders (Years 1 and 2)	6,120	
Human Communication Disorders (Year 3)	5,070	
Kinesiology and Nursing	5,280	
Occupational Therapy & Physiotherapy, and Pharmacy	6,120	
Social Work		159
Law	5,895	
Management		
Business Administration (2-year programme) & Public Administration		144
Environmental Studies & Library & Information Studies	4,335	
Business Administration (10-month programme)	7,050	
Marine Affairs	4,335	
Medicine		
Community Health & Epidemiology	5,280	
Science (Applied Science, Environmental Design)	4,875	
<b>Doctorate</b>		
Arts and Social Sciences	4,500	
Computer Science	5,094	
Education	3,930	
Engineering	5,094	
Law	6,096	
Science (Applied Science, Environmental Design)	5,094	
<b>Continuing Fee</b>		
All Programmes	1,335	
<b>INTERNATIONAL STUDENT DIFFERENTIAL FEE</b>		
All Programmes	3,090	

NOTE: Fees are assessed on either a programme or per-tuition-hour basis.

### D. Academic Fees

The 2001/2002 academic fee schedule is not yet available. Once fees are approved for 2001/2002, a complete schedule showing the required payments of the academic fees and deposits will be made available. The official schedule will be included in the registration package.

NOTE: Students registered in more than one programme are required to pay separate academic fees for each programme.

### E. Payment

The payment of academic fees will be received at the Student Accounts Office located on the basement level of the Arts & Administration building or Student Service Centre.

**TABLE II: RESIDENCE RATES - 1999-2000 - PAYMENT ALTERNATIVES - For Information Only**

RESIDENCE TYPE	Deposits					
	1st Deposit and Appl Fee	2nd Deposit Term Fees	Balance of 1st Fees	Total 1st Term Fees	Total 2nd Term Fees	Total Room & Board Fees
<b>Traditional <sup>(1)</sup></b>						
Howe Hall						
Single Room	125	200	2,375	2,700	2,930	5,630
Double Room	125	200	2,190	2,515	2,72	5,240
Shirreff Hall and Eliza Ritchie Hall						
Single Room	125	200	2,370	2,695	2,915	5,610
Double Room	125	200	2,180	2,505	2,715	5,220
Residence House						
Single Room	125	200	1,210	1,535	1,660	3,195
Double room	125	200	1,010	1,335	1,450	2,785
Apartments						
Glengary						
Bachelor Apts.	125	200	1,795	2,120	2,295	4,415
3-person (3 bedroom)	125	200	1,425	1,750	1,895	3,645
Fenwick Place <sup>(3)</sup>						
2-person (2 bedroom)	125	200	1,675	2,000	2,005	4,005
3-person (3 bedroom)	125	200	1,505	1,830	1,830	3,660
4-person (4 bedroom)	125	200	1,310	1,635	1,630	3,265

**Meals Only - Special Rate for session**

Meal only plans may be purchased from Dalhousie Food Service Office, Howe Hall.

	1st Term	2nd Term	Total
19 meal Plan per Week	\$1,050	\$1,140	\$2,190
14 meal Plan per Week	\$1,015	\$1,100	\$2,115

PLEASE NOTE: The above fees will be superseded on July 1, 2000 when the 2000/2001 residence fee schedule will be published.

(1) The residence rates include a residence council fee (Howe Hall \$50; Shirreff Hall and Eliza Ritchie Hall \$30). In addition, the residence fees include the cost of a 19 meal plan per week. If the 14 meal plan option is chosen, the fees will be reduced by \$75 from the Total.

(2) At Fenwick Place \$100 of the \$125 prepaid is a damage deposit. See application form for details.

**SEXTON CAMPUS RESIDENCE RATES 1999-2000 - For Information Only**

The residence fees are due upon arrival at the beginning of each term.

	Fall	Winter
O'Brien Hall		
Super Single room with 19 meals/week	2,890	2,750
Super Single room with 14 meals/week	2,780	2,670
Super Single room with 10 meals/week	2,620	2,475
Single room with 19 meals/week		
Single room with 14 meals/week	2,785	2,650
Single room with 10 meals/week	2,675	2,570
Single room with 10 meals/week	2,515	2,375
Double room with 19 meals/week		
Double room with 14 meals/week	2,530	2,405
Double room with 10 meals/week	2,420	2,325
Double room with 10 meals/week	2,260	2,130
Grad House		
Super Single room with 19 meals/week	2,840	2,705
Super Single room with 14 meals/week	2,730	2,625
Super Single room with 10 meals/week	2,570	2,430
Super Single room without meals	1,700	1,555

PLEASE NOTE: The above fees will be superseded on July 1, 2000 when the 2000/2001 residence fee schedule will be published.

(1) For all residences the prepaid deposit of \$125 includes a \$25 non-refundable application fee.

(2) The second deposit due on June 15 is a \$200 non-refundable deposit to confirm the room.

(3) The O'Brien Hall fees include a \$20 per term residence council fee.

For the convenience of students, non-cash payments are accepted by mail. Please allow sufficient time to ensure that material sent by mail is received on or before the specified dates.

Fees paid by mail must be received by Student Accounts on or before the deadlines specified in order to avoid late payment and/or delinquency charges.

The following regulations apply to the payment of academic fees. For further information on regulations regarding withdrawal of registration, please refer to Section I Class Changes, Refunds and Withdrawals:

- a) All students must pay the applicable deposit in accordance with Section A.
- b) Those holding external scholarships or awards paid by or through Dalhousie must provide documentation of the scholarship or award.
- c) Those whose fees are paid by a government or other agency must provide a signed statement from the organization at time of registration. (Please Note: Upon request, account status information will be made available to a sponsor.)
- d) Those paying the balance of their account by Canada Student Loan must negotiate the Loan by September 21 or January 21 for the respective term. Interest will be charged after these dates and a late registration fee will apply.
- e) Those whose fees are paid by Dalhousie University staff tuition fee waiver must present the appropriate waiver form and pay applicable incidental fees. Any unused portion of the applicable registration deposit will be refunded.
- f) Those who are Canadian citizens or permanent residents, 65 years of age or over and enrolled in an undergraduate degree programme will have their tuition fees waived but must pay the applicable incidental fees. Any unused portion of the applicable registration deposit will be refunded.
- g) Scholarships or awards paid by or through Dalhousie University will be applied to tuition and residence fees.
- h) When Canada Students Loan, Provincial Loan or co-payable bursary is presented at the Student Accounts Office, any unpaid academic, residence fees and/or Temporary Loans will be deducted.
- i) Fees cannot be deducted from salaries paid to students who are employed at Dalhousie University.
- j) Any payments will first be applied to overdue accounts.
- k) Account information will be available to any third party (sponsor) who has paid fees (i.e. parents, grandparents, government or other agency).

## F. International Students

### i.) Differential Fee

Registering students who are not Canadian Citizens or permanent residents are required to pay an additional fee referred to as a "Differential Fee" in the amount of \$1800.00 maximum per term, 2000/2001 fees, for information only. There is a proportional charge for part-time International students. Graduate Students please see Section 4.8.2 of the Graduate Studies Calendar to determine the number of years a student is required to pay the differential fee.

### ii.) Health Insurance

International students will be required to purchase an international health insurance plan. If a student already has coverage for the academic year, they may apply to Student Accounts on or before September 28, 2001 for reimbursement. Proof of coverage will be required. Details regarding the opt out procedure will be provided in the registration material or is available on Student Accounts website.

Health Insurance - International Students (2000/2001 fees, for information only)

- Single - \$550.00 per year
- Family - \$1500.00 per year

## G. Audit Classes

All students auditing a class pay one-half of the regular tuition fee plus auxiliary fees, if applicable. In such cases, the student is required to complete the usual registration process.

A student who is registered to audit a class who during the session wishes to change their registration to credit must receive approval from the Registrar and pay the difference in class fees plus a transfer fee of \$25.00. This must be done on or before the last day for withdrawal without academic penalty. The same deadline applies for a change from credit to audit.

## H. Class Changes, Refunds and Withdrawals

Please consult Student Accounts for all financial charges and the Office of the Registrar for academic regulations.

### Refund Conditions

**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](http://www.dal.ca/online) or written notification is received at the Office of the Registrar.**

In the Faculties of Architecture and Health Professions students who wish to withdraw from the University must obtain written approval from the appropriate School or College and submit the appropriate forms to the Registrar. Students should not discontinue attendance at any class until their withdrawal has been approved.

A refund of fees will not be granted unless the following conditions are met:

- a) Notification of withdrawal must be submitted to the Office of the Registrar, as indicated above.
- b) After the approval of the Registrar has been obtained (in the case of graduate and professional school, the appropriate Dean), application for a refund or adjustment of fees should be requested from the Student Accounts Office immediately. The calculation of the refundable portion of fees will be based on this date. (Retroactive withdrawals will not be permitted.)
- c) No refunds will be made for 30 days when payment has been made by personal cheque or a cheque drawn on a bank outside of Canada.
- d) A student who is dismissed from the University for any reason will not be entitled to a refund of fees.
- e) Refunds will be made to the Bank if a student has received a Canada or Provincial Student Loan.
- f) Refunds will be prorated on fees paid by Scholarships and/or Fee Waiver.
- g) A valid Dalhousie University ID must be presented in order for the student to receive a refund cheque.
- h) No fee adjustment will be made for a student changing their degree or programme in the regular session after September 21.

## I. Delinquent Accounts

Accounts are considered delinquent when the balance of fees has not been paid by September 21 for the fall term, (January 21 for students registered for the winter term. Where payment in two instalments is permitted, the remaining balance is due January 21.

Interest at a monthly rate set by the University will be charged on delinquent accounts for the number of days overdue.

At the time of printing the rate of interest is 10.00% per annum.

A student whose account is delinquent for more than 30 days will be denied University privileges including access to transcripts and records of attendance. The student will be reinstated upon payment of the fees outstanding, the arrears interest and a \$50.00 reinstatement fee. Students will not be permitted to register for another term or session until all outstanding accounts are paid in full. Subsequently, if the bank returns the cheque, the student may be deregistered.

Students whose accounts are delinquent on April 15 may not be eligible, at the sole discretion of the University, for graduation at the May convocation. For October graduation the date is September 1.

Accounts which become seriously delinquent may be placed on collection or further legal action may be taken against the individual. Students will be responsible for charges incurred as a result of such action.

## J. Canada Student Loans

Students planning to pay from a Canada Student Loan should apply to their Province in April or May so that funds will be available by time payment is required. The University will deduct fees/charges from the loan at the time of endorsement. Please contact the appropriate provincial office to determine eligibility as well as class load requirements. A late fee of \$50.00 will apply if the loan is negotiated after September 21, 2001. (January 21, 2002 for students registered for winter term only, and May 13 for students registering for the summer term).

## K. Provincial Bursaries and University Scholarships

These cheques are distributed by the Student Accounts Office. Any unpaid Fees and/or Temporary Loans along with charges, if applicable, are deducted and payment will be issued within one week of endorsement for any balance remaining. A valid Dalhousie University ID and Social Insurance Number must be presented in order to receive cheques. Please contact the appropriate provincial office to determine eligibility as well as class requirements for Provincial Bursaries. For more information on Student Loans, Bursaries or Scholarships inquiries should be directed to the Registrar's Office - Information Centre located on the first floor of the Arts & Administration building, Room 123. Telephone (902) 494-6557.

## L. Income Tax Credit from Academic Fees

The amount of academic fees constituting an income tax credit is determined by Revenue Canada, Taxation. Currently, the tax credit for students is calculated by deducting the following from Academic Fees: Student Union fees, and Society fees. Seventeen percent (17%) of the remaining balance constitutes the tax credit.

A special income tax certificate (T2202A) will be available at Student Accounts annually no later than February 28. A photocopy of the T2202A will be provided on request for a charge of \$5.00 per receipt. On request, a replacement tax receipt will be provided within 2 weeks for a charge of \$10.00 per receipt.

## M. Identification Cards

All full and part-time students should obtain identification cards upon registration and payment of proper fees. If a card is lost, a fee of \$15.00 is charged. Regular academic year ID cards remain valid until the beginning of the following academic year (including summer session).

## N. Student Union Fee Distribution

Every student registered at Dalhousie is automatically a member of the Student Union and is therefore required to pay a Student Union fee as part of their registration procedure. These fees have been approved by students in referenda and, along with other revenue of the Union, are allocated each year by the Student Council in a budget.

What follows is the breakdown of how Student Union fees are spent. If you have any questions or comments please contact the Student Union Office located in Room 222 of the SUB Telephone No. 494-2146. Architecture, Computer Science, and Engineering students please contact the Student Union Office located in the J Building at 1360 Barrington Street.

### 2000-2001 Student Union Fees Per Term Full-Time (9 billing hours or more) - For information only

General Operation	\$24.15
C K D U - FM	2.00
Facility Improvement Fee	5.00
Women's Centre Fund	1.35
Student Accessibility Fund	1.00
Gazette	2.50
Capital Fund	20.00
TOTAL	\$56.00
DSU Health Insurance	\$97.00

*Students with separate health insurance may apply to the DSU on or before September 28, 2001 for reimbursement.*

## O. Laboratory Deposits

A deposit for the use of laboratory facilities in certain departments is required. The deposit is determined and collected by these departments. Students will be charged for careless or willful damage regardless of whether or not a deposit is required.

## P. Athletic Fee

Membership at Dalplex for 2000/2001 is included in the athletic fee for all full-time students at Dalhousie and all part-time students at Dalhousie taking a minimum of three full credit classes. Membership in Dalplex for ALL other part-time students at Dalhousie may be obtained at the office of Dalplex at the prevailing rates.

## Table I: MISCELLANEOUS FEES 2001-2002

FEE . . . . .	AMOUNT . . . . .	PAYABLE AT
Replacement Tax Receipt	\$10	Student Accounts
Photocopy Tax Receipt	\$5	Student Accounts
Late Registration	\$50	Student Accounts
Reinstatement Fee	\$50	Student Accounts
Returned Cheque	\$20	Student Accounts
Admission Deposit	\$200	Student Accounts
Change from Audit to Credit	\$25	Student Accounts
Confirmation of Fee Payment	\$5	Student Accounts
Leave of Absence Fee	\$25	Graduate Studies
Application Fee	*\$40	Registrar
Confirmation of Enrolment	\$5	Registrar/Grad. Studies
Late Graduation Application	\$50	Registrar
Letter of Permission per class		
- maximum of \$50.00	\$10	Registrar
Reassessment Fee	\$50	Registrar
Replacement ID	\$15	Registrar
Transcript	\$5	Registrar
Priority Transcript Fee	\$15	Registrar
Same Day Transcript Fee	\$25	Registrar
FAX Fees:		
Metro	\$5	Registrar
Canadian	\$10	Registrar
International	\$15	Registrar
Residence Application Fee	\$25	Residence

\* Except for the following programmes which require payment of a \$65.00 application fee: Occupational Therapy, Pharmacy, Physiotherapy, Social Work; Diploma programmes in Meteorology, Outpost and Community Health Nursing, and Health Services Administration; and all programmes in the Faculties of Medicine, Dentistry (including Dental Hygiene), Law, and Graduate Studies

Note: Indicated fees are subject to change after publication of this calendar.

## III. Residence Fees

PLEASE NOTE: The following are general statements. Given the diversity of residence facilities, available practices vary slightly from locale to locale. Applications for accommodation in all residences are accepted on the understanding that the student will remain for the whole academic session.

When students who have chosen to live in residence and have secured a room withdraw from residence before the end of the school year, there are serious financial penalties. Written notice to withdraw is always required by the Residence Life Manager or Fenwick Facilities Coordinator. Complete information on withdrawal from residence is available from the Residence Life Manager or Fenwick Facilities Coordinator and is detailed in the residence agreement to be signed by all residence students. No refund will be made to any resident who is dismissed for misconduct. Discretionary power in exceptional circumstances remains with the Director of Housing, Conferences and Ancillary Services or designate. Residence Application Forms will not be distributed until the student has been accepted by the University for the coming session. To be considered for accommodation, a completed Residence Application Form and the \$125.00 residence application fee and deposit must be received. All residents, new and returning, who have accepted a room assignment, will be required to pay a second deposit of \$200.00 by June 15 to confirm the assigned space. Failure to make a second deposit by June 15 will result in automatic cancellation of room assignment.

Once the \$200.00 deposit is paid it (along with the \$125.00) is not refundable; it is our guarantee of your intention to live in residence.

Deposits may be made by cheque, bank draft, or money order in Canadian funds and payable to Dalhousie University. No reservations will be held on post-dated or "NSF" cheques. Deposits cannot be deducted from scholarships, fellowships, or similar awards.

## A. Payment of Residence Fees

Payment may be made in full at registration or in two instalments. Scholarships may be applied to residence charges only after tuition fees for the full session are paid. The first instalment must be paid in full by September 24. Interest accrues monthly at a rate as set by the University and will be charged on all accounts outstanding after September 24 and on any second instalment outstanding after

January 24. For the 2000/2001 academic year the rate was 10% per annum. This rate is subject to change. The student will not be permitted to register for another session until all accounts are paid in full. A student whose account is delinquent for more than 30 days will be denied university privileges including access to transcripts and records of attendance and Dalplex. The student will be reinstated upon payment of the fees outstanding, the arrears interest, and a \$50.00 reinstatement fee.

For Howe Hall, Eliza Ritchie Hall, Shirreff Hall and the Residence Houses fees are paid at the Student Accounts Office. For Fenwick Place and Glengary Apartments and O'Brien Hall fees can be paid at the Student Accounts Office, Fenwick Place, or the Student Service Centre.

Students should make an appointment as soon as possible with the Associate Director of Residence Life, Fenwick Facilities Coordinator, or the Supervisor of Student Accounts if they are having financial difficulties.

## **B. Regulations and Additional Charges**

The room and board session is defined as being from the Wednesday in September before classes begin in the College of Arts and Science to the last day of regularly-scheduled examinations in the College of Arts and Science in April. Please note that, except at Fenwick Place, students must vacate the residence twenty-four hours after their last exam and that residences are closed over the Christmas holidays.

No reduction in the board charge will be made for meals not taken, except that a rebate of \$200.00 per month may be considered in the case of illness or other cause necessitating absence of four weeks or more.

In Fenwick Place the rental period is based on a 34-week period beginning on Labour Day. For more specific details on dates of semesters, students should contact the accommodations office at Fenwick Place.

In all other cases, an additional fee is payable by all residents who are registered in a Faculty where the academic session commences before or continues after the session of the College of Arts and Science. Special arrangements are to be made with the Residence Life Manager or Fenwick Facilities Coordinator for accommodation for periods prior to or following the session as defined above.

## **C. Residence Rates 2000/2001**

The residence term for Howe Hall, Shirreff Hall, Eliza Ritchie Hall, Glengary Apartments and the Residence Houses cover the time period from the Wednesday in September before classes begin in the College of Arts and Science to the last regularly scheduled examination in the Faculty of Arts and Science in April (Christmas vacation excluded).

The residence term for Fenwick Place is as follows: First semester - Labour Day to December 31, 2000; and second semester - January 1, 2001 to April 30, 2001. Those students wishing to stay beyond the residence term may do so for a daily or weekly rate. Please contact the appropriate residence for details.

**After the student has paid the first and second deposit, the balance is to be paid in two parts per the schedule in Table II: Residence Rates. The first portion by September 24, 2000 and the second portion by January 24, 2001.**

## **D. ResNet**

The following residences have been wired with ethernet so the students can connect their personal computers to the Dalhousie University campus network, the Internet, Email services, and electronic class material on the web: Howe Hall, Shirreff Hall, Eliza Ritchie Hall, Glengary Apartments, O'Brien Hall, Grad House, Fenwick Place. Check out the web page at <http://admwww1.ucis.dal.ca/housing/resnet/>. The cost to connect to ResNet is in addition to residence fees. Fees range from \$120 for line charge only to \$175-\$320 for an ethernet card and line charge.

## **IV. Sexton Campus Residence Fees**

The information on Residence Fees specified above is also applicable to residence accommodation on Sexton Campus. However, the following information is worth noting and a separate fee schedule exists (see below).

### **Additional Fees**

A Residence Council Fee of \$20.00 per session will be collected at the time fees are paid to support student-run programmes in residence. Residence fees include cable television. ResNet is available at an additional charge.

# Awards

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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. Dalhousie Graduate Scholarships

Each department has a limited number of scholarships for students pursuing a degree programme on a full-time basis. Scholarships are not offered to anyone on leave from a job with salary continuation. In order to be eligible for a Dalhousie Graduate Scholarship, a student is expected to hold at least the equivalent of a Dalhousie honours degree in an appropriate field of study. Those wishing to be considered for scholarship assistance are strongly advised to submit their completed applications for admission by January 31, and **no later than March 1**. Maximum eligibility for scholarships is two Master's years and the first four Doctoral years, but some departments may have shorter maxima.

In general, the Dalhousie Graduate Scholarship will be paid to the student in regular monthly payments on the 27th of each month, after University fees have been deducted. Cheques are available from the students' department upon presentation of a current valid Dalhousie Student identification card. 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.

Applicants for graduate scholarships should write to the graduate coordinator of the department concerned in addition to making their official application for admission to the Registrar.

Very well qualified scholars who receive awards from federal agencies may also receive Dalhousie supplements within the limits set down by the agencies offering the awards.

#### *The Izaak Walton Killam Memorial Scholarships*

Shortly before her death, Mrs. Dorothy J. Killam set aside a substantial portion of her estate for the purpose of founding the Izaak Walton Killam Fund for Advanced Studies at Dalhousie University.

Her purpose in so doing was not only to establish a perpetual memorial in his native province to her late husband, Izaak Walton Killam, industrialist and financier, but also "to help in the building of Canada's future by encouraging advanced study." It was her hope that she might thereby in some measure "develop and expand the work of Canadian Universities, and promote sympathetic understanding between Canadians and the people of other countries." It is in accordance with Mrs. Killam's wishes that Dalhousie University offers the Izaak Walton Killam Memorial 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. Canadian students are eligible for nomination for the Killam Scholarships only if they have applied for the relevant national scholarship (NSERC, SSHRC, MRC, etc.).

Only those students registered in a programme with a thesis requirement are eligible to hold the Izaak Walton Killam Memorial Scholarship.

Scholarships may be renewed annually upon evidence of satisfactory completion of work leading toward the Master's or Doctoral degree, subject to the following maxima; Masters students may hold a Killam Scholarship for 24 months and PhD students for up to 36 months. The scholarships are valued at \$16,500 (2000-2001) for a Master's programme and \$19,500 (2000-2001) for a Doctoral programme. No remission of fees accompanies the scholarships, but additional funds to assist with transportation to Halifax will be supplied. Killam scholars may perform instructing or demonstrating duties, and, if they do, will be given additional remuneration for these services.

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.

#### *The Izaak Walton Killam Postdoctoral Fellowships*

Killam funds also provide for postdoctoral fellowships in most fields of study. The annual stipend is \$36,000 (2000-2001) 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 recognized 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 using Dalhousie or King's facilities. These awards may be taken up between July 1st and January 15th but preferably in September or October. Fellows may engage in limited teaching duties in the University. A graduate seeking a Killam Memorial Postdoctoral Fellowship must request an application from the Faculty of Graduate Studies by October 15. Completed applications and supporting documents must be returned to the Department in which the applicant wishes to work, no later than December 15. The results of the competition are usually announced in mid-February, and all applicants are notified of the results.

#### *Eliza Ritchie Doctoral Scholarship for Women*

The Eliza Ritchie Doctoral Scholarship was established to commemorate Women's Centennial Year (1985) and to recognize 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 honorary degree from Dalhousie (LLD, 1927). Scholarships will be awarded to Canadians and permanent residents only and preference will be 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 \$19,000 (2000-2001) for a 12-month academic period at Dalhousie. One scholarship may be awarded each year. The deadline for receipt of the prescribed applications is 15th March. Additional information and application forms are available from the Faculty of Graduate Studies, Dalhousie University.

#### *James Robinson Johnston Graduate Scholarship for African Canadians*

The James Robinson Johnston Graduate Scholarship is supported by 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 programme of study in any discipline in which Dalhousie offers a graduate degree. Successful applicants are normally expected to have attained high standing in an honours programme.

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.

The master's-level scholarship is currently valued at \$11,750 for one twelve-month academic year of full-time study. The doctoral level scholarship is valued at \$13,295 for a twelve-month academic year of full-time study and may be renewed, subject to an annual progress review (first-class standing required) by the Faculty of Graduate Studies Scholarship Committee, for a total of 36 months of full-time study, including initial award. Fees are not waived and must be paid out of the award. The deadline for receipt of the prescribed applications is April 30. Additional information and application forms are available from the Faculty of Graduate Studies, Dalhousie University.

## B. External Scholarships

There are numerous scholarships, provided by external funding agencies, that can be held by students pursuing graduate studies at Dalhousie and other Universities. We suggest students contact the Graduate Studies Office at a nearby university and/or visit our website at [www.dalgrad.dal.ca](http://www.dalgrad.dal.ca) for additional information.

## C. Specific Disciplines

### 1. Architecture

#### *The Henry Adams Medal and The Henry Adams Certificate*

Field of Study: Architecture.

Eligibility: Students graduating from the MArch (First Professional) programme.

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 programme.

Donor or Awarding Agency: American Institute of Architects, Washington, DC.

Selection: Faculty 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 (First Professional) programme or the Civil Engineering degree programme. The award alternates between Architecture and Civil Engineering. (It will be made to Architecture next in 2003.)

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: Scholarships and Awards Committee of the Faculty of Engineering, on the recommendation of one Professor of Structural Engineering, one Professor of Architecture, one Consulting Structural Engineer, and one Consulting Architect.

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.

#### *Connor Architects and Planners/CBCL Limited Scholarship*

Field of Study: Architecture

Eligibility: Registration in the initial year of the MArch (First Professional) programme.

Number and Value: One; \$1,000.

Tenure: One year.

Basis of Award: The scholarship is awarded primarily on the basis of the applicant's academic record. Other factors, such as personality, initiative, community involvement, and other awards held by the applicant, may also weigh in the decision.

Donor or Awarding Agency: CBCL Limited, Consulting Engineers, and Connor Preston, Architects.

Selection: Faculty of Architecture.

Application: Application not 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 Faculty of Architecture.

#### *Mobil Oil Canada Scholarship: Impact and Design Studies*

Field of Study: Architecture or Planning.

Eligibility: Students registered in a Master's programme of the Faculty of Architecture who are undertaking studies pertaining to the physical, social, economic or administrative impacts of energy-related developments.

Number and Value: One or more, at the discretion of the Scholarship Committee, not exceeding \$5,000 in total value per year (subject to annual review).

Tenure: One year.

Basis of award: Written application and detailed outline of the proposed study.

Donor or Awarding Agency: Mobil Oil Canada Ltd.

Selection: Faculty of Architecture.

Application: Apply to Dean, Faculty of Architecture.

Application Deadline: December 1.

#### *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 (First Prof.) 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 (First Professional) programme 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: Faculty 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 (First Professional) programme.

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: Faculty of Architecture.

Application: Apply to Dean, Faculty of Architecture.

Application Deadline: December 1.

### ***Bruce and Dorothy Rosetti Scholarships***

Field of Study: Architecture.

Eligibility: One or more students in the first year of the MArch (First Professional) programme 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: Faculty of Architecture.

Application: Apply to Dean, Faculty of Architecture.

Application Deadline: Third Friday in November.

### ***Bruce and Dorothy Rosetti Scholarships***

Field of Study: Architecture or Planning.

Eligibility: Students registered in the Master of Urban and Rural Planning programme or the Master of Architecture (Post-Professional) programme.

Number and Value: One or more, \$6,000 total (subject to annual review).

Basis of Award: To assist students in carrying out their programmes 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.

Application: Apply to Dean, Faculty of Architecture.

Application Deadline: January 15.

### ***The Royal Architectural Institute of Canada Honour Roll***

The Royal Architectural Institute of Canada awards a certificate to the top ten percent of graduating students in each School of Architecture in Canada.

### ***The Royal Architectural Institute of Canada Medal***

The Royal Architectural Institute of Canada offers the RAIC Student Medal annually to a graduating student in each School of Architecture in Canada who, in the judgement of the faculty of the respective School, has completed the outstanding final design/thesis for that academic year.

### ***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. (First Prof.) program.

### ***Walter Gardner Stanfield Scholarships***

Field of Study: Architecture or Planning.

Eligibility: Students entering the first term of a graduate programme in the Faculty of Architecture.

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 programme to be undertaken in the Faculty.

Donor or Awarding Agency: Estate of Walter Gardner Stanfield.

Selection: Faculty of Architecture. 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 programme will be considered automatically, and recipients will be notified two weeks later.

Application: Application not required.

### ***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 1994, and is expected to be awarded again in 2004.)

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: Faculty of Architecture.

Application: Application not required.

## **2. Business Administration**

### ***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 programme. Deadline for receipt of application is March 15th.

### ***The Department of External Affairs Fellowships in International Business***

Fellowships of \$4,000 per annum are awarded to full-time second-year students specializing in the field of International Business. Candidates must be Canadian citizens or permanent residents, and have a strong academic record. Fellowship recipients will be selected on the basis of a career interest in international business and academic performance to date. For further information contact the Centre for International Business Studies, School of Business Administration.

## **3. Computer Science**

### ***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 graduate programme in the Faculty of Computer Science.

Field of Study: Computer Science

Selection: Selection will be carried out by the Graduate Committee of the Faculty of Computer Science.

Donor or Awarding Agency: Bruce and Dorothy Rosetti Bequest.

Apply to: Graduate Coordinator, Faculty of Computer Science

Application Deadline: February 15

## **4. Chemistry**

### ***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.

The prize winners receive \$1000 supplement to their stipend for one year. It is awarded on the basis of merit for work carried out in the graduate programme in Chemistry at Dalhousie University, including class work, research, the preliminary oral examination and demonstrating duties.

### ***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. One award is made in the Fall each year.

### ***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.

## **5. Economics**

### ***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.

## 6. English

### *C.L. Bennet Memorial Scholarship*

The Department of English has designated that one University scholarship in the amount of \$500 be awarded annually as a memorial to the late Professor of English, Dr. C.L. Bennet. This award will be made to an outstanding graduate of a Maritime or Newfoundland university (other than Dalhousie) who wishes to pursue an MA in English at Dalhousie. Eligible students should apply for graduate study in English in the usual way, by February 15, indicating a desire to be considered for the Bennet award. Further details may be obtained from the Department of English, Dalhousie University, Halifax, NS, B3H 3J5.

### *The James W. Tupper Graduate Fellowship in English*

This fellowship, of an annual value of approximately \$7,500 is awarded by the faculty of the Department of English to a student who proposes to do graduate work in English at a university approved by the faculty. The award need not be held at Dalhousie. Further information may be obtained from the Department of English.

## 7. 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 programme 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 programme 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.

### *Bligh Research Assistantships*

Number and Value: Varies.  
Tenure: One year, may be renewed for an additional year in the case of master's students and two additional years for Ph.D. candidates.  
Basis of Award: Research Assistantships are available to support outstanding graduate students in Food Science and Fisheries Engineering. Priority will be given to Canadian citizens or landed immigrants. In exceptional cases, assistantships will be offered to candidates who are not scholarship holders.  
Eligibility: Accepted as a full-time student in the Department of Food Science and Technology.  
Field of Study: Food Science and Technology.  
Selection: Selection will be carried out by the Associate Dean of Engineering (Graduate Studies and Research) with recommendations by the Department of Food Science.  
Donor or Awarding Agency: Department of Food Science and Technology.  
Apply to: Office of the Associate Dean (Engineering), Graduate Studies and Research.  
Application 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 recognized 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 recognized graduate programme 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 programme in Civil Engineering in the Faculty of Engineering. Preference is given to Canadian citizens who are graduates in engineering of recognized 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.

### *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 programme 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 Ph.D. 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 recognized graduate programme 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.

## **8. Environmental Studies**

### ***The Gerald and Margaret Godsoe Scholarship***

This scholarship has been established by the Godsoe family to support a highly qualified and motivated individual entering the Master of Environmental Studies (MES) programme at Dalhousie. The recipient must hold an honours degree in natural or social sciences, engineering, architecture or its equivalent, and have 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 award is valued at \$10,000 per year and may be renewable. The recipient will be selected by the Admissions Committee at the School for Resource and Environmental Studies. Additional information about application procedures is available from the School for Resource and Environmental Studies.

## **9. Library and Information Studies**

### ***Alumni Scholarship***

Annual scholarship in the amount of \$2000 established by the School's Associated Alumni. Factors considered are academic excellence and evidence of a commitment to a career in librarianship. All incoming students are automatically considered; no application is necessary.

### ***H.W. Wilson Foundation Award***

This award, valued at \$1,700, is presented by the School to an outstanding incoming student, and is renewable for the second year of the programme. All incoming students are automatically considered; no application is necessary.

## **10. Marine Affairs Programme**

### ***Maritime Awards Society of Canada (MASC) Scholarship***

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 programme. An annual financial award is presented to the most deserving MMM graduate at the end of each academic year in October. The candidate 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. Students must have met all requirements to graduate by September 1 of each year in order to be eligible for award consideration.

## **11. 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 programme. 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, have a grade point average of 3.66 or greater, clearly state her/his career and educational goals and how the particular programme will contribute to their development, be accepted as a full-time student or have completed 3 full credits in a recognized 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 programme 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 programme 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 in alternate years to a graduate student in Nursing or Social Work. Master of Nursing students are eligible to apply in the Fall of 1999. Further information is available from the School of Nursing.

### ***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. Deadline for application is August 15th.

## **12. Occupational Therapy**

### ***Dr. Gustave Gingras 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 Master of Science (Occupational Therapy) programme at Dalhousie University who wishes to conduct thesis research on an international topic.

### ***Barbara O'Shea Graduate 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. The purpose is to support one or two full time or part-time students entering the first year of the Master of Science (Occupational Therapy) programme 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) programme, Dalhousie University.

#### ***Psychiatry Practicum Award***

The Department of Psychiatry, Dalhousie, will fund a \$2000.00 per year Psychiatry Practicum Award for a Master of Science (Occupational Therapy) student. The student must make a practicum contribution in any of the mental health services which are associated with the Department of Psychiatry in any of the three Maritime provinces (New Brunswick, Nova Scotia, or Prince Edward Island). If you wish to apply for this award, include a separate letter with your application materials which outlines the practicum contribution you will be making to a mental health service associated with the Department of Psychiatry. The letter must be sent to the Graduate Coordinator, School of Occupational Therapy.

#### ***School of Occupational Therapy Graduate Scholarship***

The School's Graduate Scholarship Fund supports full or part-time students who are entering the School's Master of Science (Occupational Therapy) programme. 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 at least \$350 are offered annually.

### **13. Oceanography**

#### ***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 programme 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.

### **14. 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 Programme 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.

### **15. Physics**

#### ***The William Leiper Memorial Scholarship***

An endowment has been established to provide an annual scholarship to a deserving graduate student in physics. Awarded at the discretion of the Physics Department, the scholarship is normally granted to a student already engaged in graduate study at Dalhousie.

#### ***The James Gordon MacGregor Memorial Teaching Fellowship in Physics***

One fellowship valued at \$2,500 is offered. To be eligible, the candidate must have the necessary qualifications for admission to the Master's programme in Physics. The holder of this fellowship is expected to give instruction in the laboratory during the academic session. Nominees will be selected by the Department from those students being considered for a Dalhousie Graduate Fellowship; no application is necessary.

#### ***The Dr. A. Stanley MacKenzie Teaching Fellowship in Physics***

One fellowship valued at \$600 is offered. To be eligible, the candidate must have the necessary qualifications for admission to

the Master's programme in Physics. The holder of this fellowship is expected to give instruction in the laboratory during the academic session. Nominees will be selected by the Department from students being considered for Dalhousie Graduate Fellowships; no application is necessary.

#### ***The OZ Optics Ltd. Graduate Scholarship in Physics***

One scholarship valued at \$1,500 is offered. To be eligible, the candidate must be doing graduate work in the area of fibre optics or a related field in Physics. The holder of this scholarship is expected to give instruction in a teaching laboratory during the academic session. Nominees will be selected by the Department from those students being considered for a Dalhousie Graduate Fellowship; no application is necessary.

### **16. Psychology**

#### ***The Dr. Mabel E. Goudge Scholarship in Psychology***

In her Will, the late Dr. Mabel Goudge bequeathed a sum of money with which to endow scholarships to qualifying graduate psychology students at Dalhousie. The scholarship in graduate studies is restricted to 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), valued at \$1,000, the Psychology Department established the D.O. Hebb Post-Graduate Prize, which is awarded by the Graduate Programme Committee, to an entering Masters or PhD student who has demonstrated the best potential to make a significant scientific contribution to the field of psychology.

### **17. Social Work**

#### ***The Kavanaugh Scholarship***

The Kavanaugh Scholarship was established by the Social Action Commission of the United Baptist Convention of the Atlantic Provinces to provide financial assistance in an annual amount of \$500.00 to a Master of Social Work student. Terms of reference and application forms are available to registered MSW students in early fall from the main office of the School.

#### ***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 programme who has demonstrated a high level of academic achievement and a potential for leadership in the field of social work. Application forms are available in early fall from the office of the Maritime School of Social Work.

#### ***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 in alternate years to a graduate student in Nursing or Social Work. MSW students are eligible to apply in the fall of 1998. Further information is available from the Maritime School of Social Work.

#### ***Raul Leger Memorial Humanitarian Awards***

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 is presented to a graduating BSW or MSW student, who is nominated on the basis of achievement with a continued involvement in critical social issues.

### **18. Urban and Rural Planning**

#### ***Atlantic Planners Institute Student Award***

Field of Study: Urban and Rural 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 no more than \$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.

Application Deadline: April 15, unless otherwise determined by API Council.

#### ***Canadian Institute of Planners Student Award for Academic Excellence***

Field of Study: Urban and Rural 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 MURP programme.

Donor or Awarding Agency: Canadian Institute of Planners.

Selection; Department of Urban and Rural Planning

Application: Application is not required.

#### ***Canadian Institute of Planners Student Scholarship***

Value: \$2,000.

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 or team may apply. Applicant or team leader must be a student member in good standing with the CIP and must be enrolled full-time in a recognized 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 Department of Urban and Rural Planning and must be received in the CIP national office by the date specified on the application form.

#### ***Department of Urban and Rural Planning Prize***

The Department of Urban and Rural Planning awards a book prize to a student who has achieved academic excellence in the programme and contributed to the academic life of the department.

#### ***Mobil Oil Canada Scholarship: Impact and Design Studies***

Field of Study: Architecture or Planning.

Eligibility: Students registered in a Master's programme of the Faculty of Architecture who are undertaking studies pertaining to the physical, social, economic or administrative impacts of energy-related developments.

Number and Value: One or more, at the discretion of the Scholarship Committee, not exceeding \$5,000 in total value per year (subject to annual review).

Tenure: One year.

Basis of award: Written application and detailed outline of the proposed study.

Donor or Awarding Agency: Mobil Oil Canada Ltd.

Selection: Faculty of Architecture.

Application: Apply to Dean, Faculty of Architecture.

Application Deadline: December 1.

#### ***Bruce and Dorothy Rosetti Scholarships***

Field of Study: Architecture or Planning.

Eligibility: Students registered in the Master of Urban and Rural Planning programme or the Master of Architecture (Post-Professional) programme.

Number and Value: One or more, \$6,000 total (subject to annual review).

Basis of Award: To assist students in carrying out their programmes 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.

Application: Apply to Dean, Faculty of Architecture.

Application Deadline: January 15.

#### ***Walter Gardner Stanfield Scholarships***

Field of Study: Architecture or Planning.

Eligibility: Students entering the first term of a graduate programme in the Faculty of Architecture.

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 programme to be undertaken in the Faculty.

Donor or Awarding Agency: Estate of Walter Gardner Stanfield.

Selection: Faculty of Architecture. 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 programme will be considered automatically, and recipients will be notified two weeks later.

Application: Application not required.

## **II. Bursaries**

### **A. Dalhousie Graduate Bursaries**

Students who unexpectedly find themselves in financial need may apply to the Graduate Studies Office for university bursaries made available through the student assistance programme.

The Faculty of Graduate Studies also administers the John and Lina Graham bursary for Commonwealth students and the Dr. P. Anthony Johnstone Memorial bursary for a graduate student with a record of involvement in social justice and human rights.

Bursaries are for only those students who can prove their need.

Students eligible for government loans must have applied for them before a bursary application can be considered. Normally, students in year one of their programme are not eligible for bursaries. Please note there are no appeals on bursary decisions. Please contact the Faculty of Graduate Studies office for further information.

#### ***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. The net annual income may be used to assist one or more 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.

#### ***The Dr. P. Anthony Johnstone Memorial Bursary***

The donors established this fund in 1994 to honour the memory of P. Anthony (Tony) Johnstone (1931-1989), scholar, educator and director of the Nova Scotia Human Rights Commission, 1985-1989. The net income may be used to assist a humanities or social science graduate student who has a record of interest and involvement in social justice and human rights.

#### ***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 programmes, 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. Information and application forms are available in early fall from the office of the Maritime School of Social Work.

#### ***Hanna G. Matheson Bursaries***

These bursaries are available to students enrolled in the BSW or MSW degree programmes on the basis of need. The fund is administered by the Registrar's Office, from which application forms are available.

## **III. Teaching Assistantships**

Most departments offer Teaching Assistantships. The number, amounts and conditions vary. Please enquire of your department or school.

#### ***The President's Graduate Teaching Assistant Awards***

Dalhousie University recognizes and applauds the important contributions of Graduate Teaching Assistants to the educational mission of the University. The work of TAs, both in the classrooms or

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 Office of Instructional Development and Technology. The winners are chosen in the Spring of each year, and the presentation of awards is made by the President during Convocation.

## **IV. Research and Travel Grants**

### **A. Research Grants**

Small research grants to assist thesis research can be applied for by graduate students in the Social Sciences and Humanities. (The expenses of most science students are covered out of operating grant or departmental funds). Forms are available in the Graduate Studies Office, or on the web at [www.dalgrad.dal.ca](http://www.dalgrad.dal.ca). Students should note that, where applicable, funds will not be approved until Human Ethics approval of their proposal has been received. Awards granted to students will be set up under their supervisor's signing authority. Students in other disciplines may also apply to the Faculty of Graduate Studies for small grants if and only if their departments are unable to help them because of an unforeseen emergency. A letter from the Department Chair/Graduate Coordinator to this effect must accompany the application.

### **B. Travel Grants**

Travel grants for presentation of a paper or poster at scholarly meetings can be applied for by graduate students in thesis programmes using forms available in the Graduate Studies Office. Students are eligible to apply for one travel grant during the period of their graduate degree programme at Dalhousie, and should be presenting a paper or poster based on their thesis research. Departmental approval must be given to these applications. Applications will not be accepted retroactively or for conferences which occur after graduation.

## **V. Awards on Graduate Transcripts**

A select number of Dalhousie Scholarships/Awards are recorded on the students official Dalhousie transcript. They are:

- Killam and Honorary Killam Scholarships,
- Eliza Ritchie and honorary Eliza Ritchie Scholarship,
- J. R. Johnston and honorary J. R. Johnston Scholarship,
- Governor General's Gold Medal.

An official letter confirming other Dalhousie scholarships (e.g. Dalhousie Graduate Scholarships) can be obtained upon request from the Faculty of Graduate Studies Office. An administrative fee of \$5.00 will be charged.

# Index

## A

Academic Dates	1
Academic Programmes	7
Academic Regulations	8
Accessibility for Students with Disabilities	10
Accounts	
See Fees	
Admission Dates 2000/2001	2
Admission Deposit	259
Admission Requirements	
Application Deadlines	2
Interdisciplinary Neuroscience	182
Learning Disabilities, Students with	11
African Studies, Centre for	247
Agriculture	32 - 36
Alumni Association	251
Anatomy and Neurobiology	37 - 39
Anthropology	236 - 238
Application Deadline	2
Architecture	40 - 48
Arts Centre	252
Athletic Fees	263
Athletics	251
Atlantic Research Centre	246
Atmospheric Science	49
Audit Classes	
Fees	262

## B

Biochemistry	50 - 52
Biological Engineering	53 - 54
Biophysics	208 - 210
Black Students	251
Board of Governors	6
Bookstore	256

## C

Canadian Institute of Fisheries and Technology	247
Centre for Marine Vessel Development and Research	248
Centre for Water Resources Studies	248
Centres and Institutes	246 - 250
Chaplaincy	251
Chemistry	78 - 82
Civil Engineering	83 - 86
Classics	87
Clubs and Organizations	256
Code of Student Conduct	13
Community Health and Epidemiology	88 - 90
Computer Science	91 - 95
Computing	
Guide to Responsible	15
Computing and Information Services	257
Continuing Education Division - DalTech	251
Counselling and Psychological Services	251
Criminology, Atlantic Institute of	246

## D

DalCard	252
Dalhousie University	5 - 6
Board of Governors	6
Executive Officers	5
Senate	7
Dalplex	
Fee	263
Definitions	3 - 4
Deposits	
Admission	259
Registration	259

Disabilities, Services for Students with	255
Discipline	12

## E

Earth Sciences	96 - 98
Education	104
Electrical and Computer Engineering	104 - 107
Electronic Commerce, Master of	92
Engineering	
Biological Engineering	53 - 54
Chemical Engineering	76 - 77
Civil Engineering	83 - 86
Electrical and Computer Engineering	104 - 107
Engineering Mathematics	117 - 118
Food Science Technology	130 - 131
Industrial Engineering	153 - 154
Internetworking	158 - 159
Mechanical Engineering	171 - 174
Mining and Metallurgical Engineering	179 - 181
Engineering Mathematics	117 - 118
Examination Regulations	9

## F

Faculty of Architecture	
Architecture	40 - 48
Urban and Rural Planning	241 - 244
Faculty of Arts and Social Sciences	
Classics	87
English	119 - 124
French	132 - 135
German	136
History	145 - 149
International Development Studies	156 - 157
Philosophy	202 - 204
Political Science	212 - 217
Sociology and Social Anthropology	236 - 238
Women's Studies	245
Faculty of Computer Science	
Computer Science	91 - 95
Electronic Commerce	108 - 109
Faculty of Dentistry	
Oral and Maxillofacial Surgery	195 - 196
Faculty of Engineering	
Biological Engineering	53 - 54
Biomedical Engineering	60 - 62
Chemical Engineering	76 - 77
Civil Engineering	83 - 86
Electrical and Computer Engineering	104 - 107
Engineering - General	110 - 116
Engineering Mathematics	117 - 118
Food Science and Technology	130 - 131
Industrial Engineering	153 - 154
Internetworking	158 - 159
Mechanical Engineering	171 - 174
Mining and Metallurgical Engineering	179 - 181
Faculty of Graduate Studies	
Education	104
Interdisciplinary PhD Programme	155
Marine Affairs Programme	166 - 167
Faculty of Health Professions	
Health and Human Performance	137 - 140
Health Education	137 - 140
Health Services Administration	141 - 144
Human Communication Disorders	150 - 152
Kinesiology	137 - 140
Leisure Studies	137 - 140
Nursing	184 - 187
Occupational Therapy	188 - 190
Pharmacology	199 - 200
Pharmacy	201
Physiology and Biophysics	208 - 210
Physiotherapy	211
Social Work	232 - 235
Faculty of Law	
Electronic Commerce	108 - 109
Law	160 - 162
Faculty of Management	
Business Administration	63 - 75

Electronic Commerce .....	108 - 109	Thesis Regulations .....	27
Environmental Studies .....	125 - 129	Thesis Supervisors and Supervisory Committees .....	26
Library & Information Studies .....	163 - 165	<b>H</b>	
Library and Information Studies .....	163 - 165	Health Education .....	138
Public Administration .....	223 - 231	Health Law Institute .....	248
Faculty of Medicine		Health Professions, Faculty of	
Anatomy and Neurobiology .....	37 - 39	Professional Unsuitability .....	15
Biomedical Engineering .....	60 - 62	Health Promotion Centre, Atlantic .....	246
Community Health and Epidemiology .....	88 - 90	Health Services .....	257
Medical Sciences .....	175	Health Services Administration .....	141 - 144
Neuroscience .....	182 - 183	History .....	145 - 149
Pathology .....	197 - 198	Housing and Residence Services .....	252
Physiology and Biophysics .....	208 - 210	Human Communication Disorders .....	150 - 152
Faculty of Science		<b>I</b>	
Agriculture .....	32 - 36	Identification Cards Fees .....	263
Atmospheric Science .....	49	Industrial Engineering .....	153 - 154
Biochemistry and Molecular Biology .....	50 - 52	Institutes	
Biology .....	55 - 59	Atlantic Health Promotion Centre .....	246
Chemistry .....	78 - 82	Atlantic Institute of Criminology .....	246
Earth Sciences .....	96 - 98	Atlantic Region Magnetic Resonance Centre .....	246
Economics .....	99 - 103	Atlantic Research Centre .....	246
Economics (including Development Economics) .....	99 - 103	Canadian Institute of Fisheries Technology .....	247
Mathematics .....	169 - 170	Centre for African Studies .....	247
Mathematics and Statistics .....	168	Centre for Foreign Policy .....	247
Microbiology and Immunology .....	176 - 178	Centre for International Business Studies .....	247
Neuroscience .....	182 - 183	Centre for Marine Geology .....	248
Oceanography .....	191 - 194	Centre for Marine Vessel Development and Research .....	248
Physics .....	205 - 207	Centre for Water Resources Studies .....	248
Psychology .....	218 - 222	See Centres and Institutes	
Statistics .....	239 - 240	Dalhousie Health Law Institute .....	248
Fees 259 - 264		Lester Pearson International (LPI) .....	255
Academic Fees .....	260	Minerals Engineering Centre .....	249
Athletic Fees .....	263	Neuroscience Institute .....	249
Audit Classes .....	262	Nova Scotia CAD/CAM Centre .....	249
Bursaries .....	263	Trace Analysis Research Centre .....	250
Canada Student Loans .....	262	Vehicle Safety Research Team .....	250
Class Changes .....	262	Instructional Development and Technology .....	254
Delinquent Accounts .....	262	Intellectual Honesty .....	12
Identification Cards .....	263	Interdisciplinary and Joint Programme Listings .....	155
Income Tax Credit .....	263	Interdisciplinary PhD .....	155
International Students .....	262	Neuroscience .....	182 - 183
Laboratory Deposits .....	263	International Business Studies, Centre for .....	247
Late Registration .....	259	International Student Advisor .....	254
Limited Enrolment Programmes .....	259	Internetworking .....	158 - 159
Payment .....	260	<b>K</b>	
Refunds .....	262	Kinesiology .....	139
Registration .....	259	<b>L</b>	
Registration Deposits .....	259	Laboratory Deposits .....	263
Regulations .....	259	Leisure Studies .....	139
Residence .....	263	Lester Pearson International (LPI) .....	255
Scholarships .....	263	Libraries .....	255
Student Union Fee Distribution .....	263	Loans	
Withdrawals .....	262	Canada Student .....	262
Fellowships .....	265	<b>M</b>	
Financial Aid .....	258	Magnetic Resonance Centre, Atlantic Region .....	246
Government Student Loans .....	258	Marine Affairs Programme .....	166 - 167
FOIPOP .....	10	Marine Geology, Centre for .....	248
Food Science Technology .....	130 - 131	Mechanical Engineering .....	171 - 174
Foreign Policy Studies, Centre for .....	247	Microbiology and Immunology .....	176 - 178
Freedom of Information and Protection of Privacy .....	10	Minerals Engineering Centre .....	249
French .....	132 - 135	Mining and Metallurgical Engineering .....	179 - 181
<b>G</b>		<b>N</b>	
German .....	136	Neuroscience .....	182 - 183
Government Student Loans .....	258	Neuroscience Institute .....	249
Graduate Programmes .....	17	Nova Scotia CAD/CAM Centre .....	249
Graduate Studies .....	17 - 31	Nursing .....	184 - 187
Admission Requirements .....	18	<b>O</b>	
Appeals .....	31	Occupational Therapy .....	188 - 190
Conflict of Interest .....	23	Oceanography .....	191 - 194
Degree Requirements .....	23	Ombud's Office .....	255
Examinations .....	25	Oral and Maxillofacial Surgery .....	195 - 196
Faculty Regulations .....	17	<b>P</b>	
Integrity in Scholarly Activity .....	23	Pathology .....	197 - 198
Intellectual Honesty and Plagiarism .....	23	Pharmacology .....	199 - 200
Intellectual Property .....	23	Pharmacy .....	201
Registration Procedures and Regulations .....	20		

Philosophy	202 - 204
Physics	205 - 207
Physiotherapy	211
Plagiarism	12
Planning	241 - 244
Political Science	212 - 217
<b>R</b>	
Registrar's Office	255
Registration	
Late Registration Fees	259
Registration Deposits	259
Regulations	
Computing	15
Discipline	12
Examinations	9
Fees	259
Incomplete Examination	10
Intellectual Honesty	12
Plagiarism	12
Recission of Acceptance into a Programme	9
Release of Information	10
Residence Fees	264
Retention of Student Work	10
University	9 - 16
Release of Information	10
Residence Fees	
Additional Fees	264
DalTech Residence Fees	264
Payment	263
Regulations and Additional Charges	264
Residences	252
Resources and Services	251 - 257
Alumni Association	251
Athletics	251
Black Students	251
Chaplaincy at Dalhousie	251
Counselling and Psychological Services	251
DalCard	252
Dalhousie Arts Centre	252
Dalhousie Student Union	252
Housing and Residence Services	252
Instructional Development and Technology	254
International Student Advisor	254
Libraries	255
Ombud's Office	255
Registrar's Office	255
Services for Students with Disabilities	255
Student Advocacy Service	256
Student Clubs and Organizations	256
Student Services	256
Student Volunteer Bureau	256
Tutoring Service	256
University Bookstore	256
University Computing and Information Services	257
University Health Services	257
Writing Workshop	257
<b>S</b>	
Scholarships	265
Senate	7
Social Work	232 - 235
Sociology and Social Anthropology	236 - 238
Statistics	239 - 240
Student Advocacy Service	256
Student Conduct, Code of	13
Student Employment Centre	256
Student Services	256
Student Union	252
Fee Distribution	263
Student Volunteer Bureau	256
<b>T</b>	
Tax Credit	
Fees	263
Thesis Regulations	27
Trace Analysis Research Centre	250
Tutoring Service	256

<b>U</b>	
University Regulations	9 - 16
Urban and Rural Planning	241 - 244
<b>V</b>	
Vehicle Safety Research Team	250
<b>W</b>	
Women's Studies	245
Writing Workshop	257

# Awards Index

Awards-----265 - 272

## A

Adjeleian Awards in the Aesthetics of Structures-----266  
 Alpha Rho Chi Medal-----266  
 Alumni Memorial Award-----266  
 Alumni Scholarship-----269  
 APENS Engineering Centennial Scholarship-----268  
 Architecture-----266  
 Atlantic Planners Institute Student Award-----270  
 Awards on Graduate Transcripts-----272

## B

Bennet, C.L., Memorial Scholarship-----268  
 Bligh Research Assistantships-----268  
 Bursaries-----271  
 Business Administration-----267

## C

Canadian Institute of Planners Student Award for  
 Academic Excellence-----271  
 Canadian Institute of Planners Student Scholarship-----271  
 Chemistry-----267  
 Computer Science-----267  
 Connor Architects and Planners/CBCL Limited Scholarship-----266  
 Cragg, Margaret Award-----269  
 Cragg, Margaret, Award-----270

## D

Dalhousie Bursaries-----271  
 Department of External Affairs Fellowships in  
 International Business-----267

## E

Economics-----267  
 Engineering-----268  
 English-----268  
 Environmental Studies-----269

## G

Gingras, Dr. Gustave Award-----269  
 Godsoe, Gerald and Margaret, Scholarship-----269  
 Goudge, Dr. Mabel E., Scholarship in Psychology-----270  
 Graduate Scholarships-----265  
 Graham, John and Lina, Commonwealth Bursary-----271

## H

Hancock, Lawrence T., Scholarship-----270  
 Hart, Johnathan, Memorial Fund-----266  
 Hayes, Professor F. Ronald, International Scholarship-----270  
 Hebb, D.O., Post-Graduate Prize-----270  
 Hirth, Alexandra Award for Excellence in Nursing Research-----269

## J

Johnston, James Robinson, Graduate Scholarship for African  
 Canadians-----265  
 Johnstone, Dr. P. Anthony, Memorial Bursary-----271

## K

Kartsaklis, Professor George A.B., Memorial Scholarship-----267  
 Kavanaugh Scholarship-----270  
 Killam, Izaak Walton Postdoctoral Fellowships-----265  
 Killam, Izaak Walton, Memorial Scholarship-----265  
 Kirkpatrick, Dr. L.F., Scholarship-----268

## L

Laba, John P., Memorial Research Award-----270  
 Leffek, Kenneth T., Prize for the Best PhD Thesis in Chemistry-----267  
 Leger, Raul, Memorial Humanitarian Awards-----270  
 Leiper, William, Memorial Scholarship-----270  
 Library and Information Studies-----269

## M

MacDonald, Katherine and Robert Scholarship-----269  
 MacGregor, James Gordon, Memorial Teaching  
 Fellowship in Physics-----270  
 MacKenzie, Dr. A. Stanley, Teaching Fellowship in Physics-----270  
 MacLennan, Electa Memorial Scholarship-----269  
 Malhotra, Dr. S.K., Graduate Scholarship-----268  
 Marine Affairs Programme-----269  
 Maritime Awards Society of Canada (MASC) Scholarship-----269  
 Master of Marine Management Gold Award-----269  
 Matheson, Hanna G., Bursaries-----271  
 Medjuck Scholarship in Energy Studies-----268  
 Meyerhof, G.G., Fellowship-----268  
 Mobil Oil Canada Scholarship: Impact and Design Studies-----266,271

## N

Nova Scotia Association of Architects Scholarship-----266  
 Nova Scotia Association of Architects Prize-----266  
 Nursing-----269  
 Nycum, William, & Associates Limited Scholarship-----266

## O

Occupational Therapy-----269  
 Oceanography-----270  
 Oral and Maxillofacial Surgery-----270  
 O'Shea, Barbara Graduate Award-----269  
 OZ-Optics Ltd. Graduate Scholarship in Physics-----270

## P

Physics-----270  
 President's Graduate Teaching Assistant Awards-----271  
 Psychiatry Practicum Award-----270  
 Psychology-----270

## R

Reid, George C. and Lucille M., Scholarships-----268  
 Research and Travel Grants-----272  
 Research Grants-----272  
 Ritchie, Eliza, Doctoral Scholarship for Women-----265  
 Rosetti, Bruce and Dorothy Scholarships-----267,271  
 Rosetti, Bruce and Dorothy, Engineering Research Scholarships-----267  
 Rosetti, Bruce and Dorothy, Research Scholarships-----269  
 Rosetti, Bruce and Dorothy, Scholarships-----267  
 Royal Architectural Institute of Canada Honour Roll-----267  
 Royal Architectural Institute of Canada Medal-----267  
 Ryan, Douglas E., Prize for Excellence  
 Graduate Studies in Chemistry-----267

## S

Scholarships and Fellowships-----265  
 School of Architecture Thesis Prize-----267  
 School of Nursing MN Scholarship-----269  
 School of Occupational Therapy Graduate Scholarship-----270  
 Schulich, Goldberg Award for Entrepreneurship-----267  
 Social Work-----270  
 Stanfield, Walter Gardner, Scholarships-----267,271

## T

Teaching Assistantships-----271  
 Travel Grants-----272  
 Tupper, James W., Graduate Fellowship in English-----268

## U

Urban and Rural Planning-----270

## W

Weil, Sonja R., Memorial Bursary-----271  
 Wilby, Ernest, Memorial Scholarship-----267  
 Wilson, Anna Scholarship in Chemistry-----267  
 Wilson, H.W. Foundation Award-----269



