

**Undergraduate Programs
in
Microbiology and
Immunology
(MICI)**

Dalhousie University

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**Students should check with an advisor to ensure that the draft they have is the
most recent one**

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Introductory remarks

This Handbook provides an overview of undergraduate degree programs offered by the Dept. of Microbiology and Immunology (henceforth MICI), together with brief descriptions of research endeavours pursued by faculty members. The document is not meant to be comprehensive (it does not, for example, discuss opportunities for study abroad), and so interested students are encouraged to get in touch with an academic advisor (see below) early in their program.

In what follows, a certain sequence of courses to be taken is laid out in tabular form for each program. While adherence to this sequence is strongly encouraged, it is not necessarily absolute. E.g., the so-called writing class can be taken in any year; that said, most students elect to take care of it in year 1. Note that electives can be in any subject, including MICI.

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SOME REMARKS APPLICABLE TO ALL MICI PROGRAMS

- a maximum of 48 credit hours may be taken at the 1000 level.
- all B.Sc. students must complete 6.0 credit hours in an approved writing course, or else take SCI 1111 (3.0 credit hours).
- all B.Sc. students must complete 6.0 credit hours in mathematics or statistics.
- all B.Sc. students must complete 6.0 credit hours in languages/humanities and 6.0 credit hours in the social sciences.
- a minimum grade of B- is required in 1st year biology and chemistry in order to register in MICI 2100.
- each degree program will specify different numbers of credit hours that must be completed in the discipline; for all MICI programs, this *includes* all of the following: Biol 2020 and 2030, Bioc 2300, 2610 and 3400, and Chem 2401/2402.
- “MICI-approved” courses (see p. 5) are those provided by other Depts., but which nonetheless count as MICI credits (ie., are considered as being in the discipline).
- entry into certain 3000-level MICI courses will require grades of at least B- in prerequisite courses.
- all MICI degree programs require completion of 18 credit hours at or above the 3000 level in MICI/MICI-approved courses (includes BIOC 3400 except where BIOC is one of the two subjects in a double major or combined honours program).
- similar requirements pertain to second subjects in all double majors and combined honours programs. E.g., in a MICI and BIOL double major degree program, 6 courses in *both* subjects at or above the 3000 level are required.

Optional MICI and MICI-approved courses

- 2115 Human Organs and Tissues (W) (not offered in 2018/2019)
- 3620 Experiential Learning in Microbiology and Immunology (W; only by permission)
- 4027 Molecular Mechanisms of Cancer (W) (will not be offered every year)
- 4033 Advanced Microbial Genetics (W)
- 4100 Processes and Mediators of Inflammation (W)
- 4114 Advanced Topics in Molecular and Medical Virology (W)
- 4115 Medical Immunology (W)
- 4116 Current Topics in Mucosal Immunology (F) (will not be offered every year)
- 4118 Molecular Bacterial Pathogenesis (F) (may not be offered every year)
- 4119 Host Pathogen Interactions (F; starting in 2019)
- 4218 Clinical Microbiology (W)
- 4302 Molecular Immunology (F)
- 4703/4704 Directed Research Project (two of F, W or S) (not for Honours students, only by permission)
- 4701/4702 Advanced Topics in Microbiology and Immunology (F or W) (only by permission)
- 4901/4902 Honours Research and Thesis (two of F, W or S) (only for Honours students not for Major students)

MICI approved courses in Biology (BIOL)

- 2004 Diversity of Life II (W)
- 3101 Microbial Ecology (W)
- 3102 Microbial Eukaryotes (F)
- 3322 Parasitology (F)
- 4020 Advanced Cell Biology (W)

MICI approved course in Psychology and Neuroscience (PSYO/NESC)

- 3180 Psychoneuroimmunology/Ecoimmunology (W)

MICI approved courses in Biochemistry & Molecular Biology (BIOC)

- 4010 Bioinformatics (W)
- 4403 Genes and Genomes (W)
- 4404 Gene Expression (F)
- 4501 Medical Biotechnology I (F)
- 4835 Human Genetics (W)

F = fall term W = winter term S = summer term

Note that core (required) courses are not listed here – except that MICI 4901/4902 is obviously a requirement *if* you are enrolled in an honours program.

1– Honours Degree in MICI

Year	Courses	Description
I	CHEM 1011 & 1012 BIOL 1010 & 1011 MATH Writing Course Electives	Concepts in Chemistry (or equivalent) Principles of Biology (or BIOL 1020 & 1021) 6.0 credit hours (MATH 1000 or 1215 and MATH 1010 or 1060) 6.0 approved credit hours (Requirement I.B in Calendar or SCI 1111 (Writing for the Sciences; 3 credit hours) 6.0 credit hours
II	MICI 2100 MICI 2400 BIOL 2020 BIOL 2030 BIOC 2300 BIOC 2610 CHEM 2401 & 2402 Electives	Introductory Microbiology & Immunology (F) Laboratory Methods in Microbiology & Immunology (W) Cell Biology (F or W) Genetics (F or W) Introduction to Biochemistry (W) Introduction to Biochemistry Lab (W) Introductory Organic Chemistry 6.0 credit hours
III	MICI 3114 MICI 3115 MICI 3119 BIOC 3400 MICI 4XXX Electives	Virology (F) Immunology (F) Physiology of the Prokaryotic Cell (F) Nucleic Acid Biochemistry & Molecular Biology (F) 3.0 credit hours 15 credit hours
IV	MICI 4901/4902 MICI &/or approved courses Electives	Honours Research & Thesis 9.0 credit hours 15 credit hours

- students must complete a minimum of 54 credit hours beyond the 1000 level in the discipline.
- for courses to count in the honours subject, a grade of at least C is required.
- a minimum grade of B is required in 5 of the following: MICI 2100, 2400, 3114, 3115, 3119 and 4901/4902; a minimum grade of B- in (only) 1 of the 6 is allowed.
- for entry into an honours program, you must obtain approval from an academic advisor (see p. 3).
- for entry into MICI 4901/4902, you must have previously completed at least 3 of the 4 required 3000-level core courses.
- same workload flexibility is possible in years III and IV

2 – Combined Honours Degree in MICI and BIOC

Year	Courses	Description
I	CHEM 1011 & 1012 BIOL 1010 & 1011 MATH Writing Course Electives	Concepts in Chemistry (or equivalent) Principles of Biology (or BIOL 1020 & 1021) 6.0 credit hours (MATH 1000 or 1215 and MATH 1010 or 1060) 6.0 approved credit hours or SCI 1111 (Writing for the Sciences; 3 credit hours) 6.0 credit hours
II	MICI 2100 MICI 2400 BIOL 2020 BIOL 2030 BIOC 2300 BIOC 2610 CHEM 2401 & 2402 Electives	Introductory Microbiology & Immunology (F) Laboratory Methods in Microbiology & Immunology (W) Cell Biology (F or W) Genetics (F or W) Introduction to Biochemistry (W) Introduction to Biochemistry Lab (W) Introductory Organic Chemistry 6.0 credit hours
III	MICI 3114 MICI 3115 MICI 3119 BIOC 3300 BIOC 3400 BIOC 3700 MICI 4XXX BIOC 4XXX Electives	Virology (F) Immunology (F) Physiology of the Prokaryotic Cell (F) Intermediary Metabolism (W) Nucleic Acid Biochemistry & Molecular Biology (F) Biomolecular Chemistry (F) 3.0 credit hours 3.0 credit hours from any of BIOC 40XX, 43XX, 44XX or 47XX or BIOC 4604/4605 6.0 credit hours
IV	BIOC 4XXX MICI 4901/4902 MICI, MICI approved, BIOC, or BIOC- approved courses Electives	3.0 credit hours from any of BIOC 40XX, 43XX, 44XX or 47XX or BIOC 4604/4605 9 credit hours 12 credit hours

- students must complete a minimum of 66 credit hours beyond the 1000 level in the discipline, with a minimum of 30 in each.
- honours thesis research can be carried out in either Dept.
- some workload flexibility is possible in years III and IV.
- for additional information, see footnotes on p. 6

3 – Combined Honours Degree in MICI and BIOL

Year	Courses	Description
I	CHEM 1011 & 1012 BIOL 1010 & 1011 MATH Writing Course Electives	Concepts in Chemistry (or equivalent) Principles of Biology (or BIOL 1020 & 1021) 6.0 credit hours (MATH 1000 or 1215 and MATH 1010 or 1060) 6.0 approved credit hours or SCI 1111 (Writing for the Sciences; 3 credit hours) 6.0 credit hours
II	MICI 2100 MICI 2400 BIOL 2020 BIOL 2030 BIOC 2300 BIOC 2610 CHEM 2401 & 2402 BIOL 2040 BIOL 2060	Introductory Microbiology & Immunology (F) Laboratory Methods in Microbiology & Immunology (W) Cell Biology (F or W) Genetics (F or W) Introduction to Biochemistry (W) Introduction to Biochemistry Lab (W) Introductory Organic Chemistry Evolution (F or W) Introductory Ecology (F or W)
III	BIOL 2003 BIOL 2004 MICI 3114 MICI 3115 MICI 3119 BIOC 3400 BIOL 3XXX/4XXX BIOL 3050, 3078, 3079 MICI 4XXX Electives	Diversity I (F) Diversity II (W) Virology (F) Immunology (F) Physiology of the Prokaryotic Cell (F) Nucleic Acid Biochemistry & Molecular Biology (F) 3.0 credit hours one course (3.0 credit hours) 3.0 credit hours 3.0
IV	BIOL 3XXX-4XXX MICI 4901/4902 Electives	6.0 credit hours Honours Research and Thesis 18 credit hours

- if a majority of courses are counted as MICI, then the honours research and thesis will normally be carried out in that Dept. That said, the honours research and thesis can be based in the Biology Dept. provided that the research project is relevant to microbiology/immunology; approval of the MICI Undergrad Studies Committee is required.
- 0
- MATH 1060 is now a prerequisite for BIOL 2060.
- there is plenty of flexibility in years II-IV. E.g., while students need to take BIOL 2020 and 2030 in 2nd year, two of the other biology courses could be moved to subsequent years (to be replaced with electives in year II).
- for additional information, see footnotes for Pages 6 and 7.

4 – Major Degree in Microbiology & Immunology - MICI

Year	Courses	Description
I	CHEM 1011 & 1012 BIOL 1010 & 1011 MATH Writing Course Electives	Concepts in Chemistry (or equivalent) Principles of Biology (or BIOL 1020 & 1021) 6.0 credit hours (MATH 1000 or 1215 and MATH 1010 or 1060) 6.0 approved credit hours or SCI 1111 (Writing for the Sciences; 3 credit hours) 6.0 credit hours
II	MICI 2100 MICI 2400 BIOL 2020 BIOL 2030 BIOC 2300 BIOC 2610 CHEM 2401 & 2402 Electives	Introductory Microbiology & Immunology (F) Laboratory Methods in Microbiology & Immunology (W) Cell Biology (F or W) Genetics (F or W) Introduction to Biochemistry (W) Introduction to Biochemistry Lab (W) Introductory Organic Chemistry 6.0 credit hours
III	MICI 3114 MICI 3115 MICI 3119 BIOC 3400 MICI 4XXX Electives	Virology (F) Immunology (F) Physiology of the Prokaryotic Cell (F) Nucleic Acid Biochemistry & Molecular Biology (F) 3.0 credit hours 15 credit hours
IV	MICI &/or MICI- approved courses Electives	3.0 credit hours above the 2000 level 24.0 credit hours

- students must complete a minimum of 42 credit hours above the 1000 level in the discipline. This *includes* required courses provided by other Depts. (e.g., BIOL 2020), MICI, and MICI-approved courses.
- to count towards a major degree, you will need to obtain a grade of C- or better in required courses, and in those comprising the discipline.
- after 3 years, you may graduate with a 90 credit hour “B.Sc. with MICI minor” degree, *if* you have completed a minimum of 18 credit hours of MICI (*not* MICI-approved) courses.

5- Double Majors Degree in MICI and BIOC

Year	Courses	Description
I	CHEM 1011 & 1012 BIOL 1010 & 1011 MATH Writing Course Electives	Concepts in Chemistry (or equivalent) Principles of Biology (or BIOL 1020 & 1021) 6.0 credit hours (MATH 1000 or 1215 and MATH 1010 or 1060) 6.0 approved credit hours or SCI 1111 (Writing for the Sciences; 3 credit hours) 6.0 credit hours
II	MICI 2100 MICI 2400 BIOL 2020 BIOL 2030 BIOC 2300 BIOC 2610 CHEM 2401 & 2402 Electives	Introductory Microbiology & Immunology (F) Laboratory Methods in Microbiology & Immunology (W) Cell Biology (F or W) Genetics (F or W) Introduction to Biochemistry (W) Introduction to Biochemistry Lab (W) Introductory Organic Chemistry 6.0 credit hours
III	MICI 3114 MICI 3115 MICI 3119 BIOC 3300 BIOC 3400 BIOC 3700 Electives	Virology (F) Immunology (F) Physiology of the Prokaryotic Cell (F) Intermediary Methodology (F) Nucleic Acid Biochemistry & Molecular Biology (F) Biomolecular Chemistry (F) 12 credit hours
IV	MICI (&/or MICI- approved) courses BIOC Electives	6 credit hours, at or above the 3000 level including 3 from MICI 4XXX 15.0 credit hours, including 9 at or above the 3000 level 9.0 credit hours

- students must complete a minimum of 60 credit hours above the 1000 level in the two disciplines, with a minimum of 30 credit hours in each.
- double majors degrees are at least in theory possible in *any* two Depts., including those in FASS; for details, consult relevant academic advisors.
- students must complete a minimum of 60 credit hours in the 2 major disciplines, with at least 30 in each; within this context, students will normally fulfill core requirements as defined by each Dept.
- to count towards the degree, a grade of C- or better in discipline courses is required.

6 – Double Majors Degree in MICI and BIOL

Year	Courses	Description
I	CHEM 1011 & 1012 BIOL 1010 & 1011 MATH Writing Course Electives	Concepts in Chemistry (or equivalent) Principles of Biology (or BIOL 1020 & 1021) 6.0 credit hours (MATH 1000 or 1215 and MATH 1010 or 1060) 6.0 approved credit hours or SCI 1111 (Writing for the Sciences; 3 credit hours) 6.0 credit hours
II	MICI 2100 MICI 2400 BIOL 2020 BIOL 2030 BIOL 2040 BIOL 2003,2004,2060 BIOC 2300 CHEM 2401 & 2402	Introductory Microbiology & Immunology (F) Laboratory Methods in Microbiology & Immunology (W) Cell Biology (F or W) Genetics (F or W) Evolution (F or W) 6.0 credit hours Introduction to Biochemistry Lab (W) Introductory Organic Chemistry
III	BIOC 2610 BIOL 2XXX (or above) BIOL 3XXX (or above) MICI 3114 MICI 3115 MICI 3119 BIOC 3400 MICI 4XXX Electives	Introduction to Biochemistry (W) 3.0 credit hours 6.0 credit hours Virology (F) Immunology (F) Physiology of the Prokaryotic Cell (F) Nucleic Acid Biochemistry & Molecular Biology (F) 3.0 credit hours 3.0 credit hours
IV	MICI (or MICI approved) BIOL Electives	6.0 credit hours, including 3 at or above the 3000 level 12.0 credit hours at or above the 3000 level 12.0 credit hours

- MATH 1060 is now a prerequisite for BIOL 2060.

7 – Double Majors Degree in MICI and Neuroscience

Year	Courses	Description
I	CHEM 1011 & 1012 BIOL 1010 & 1011 MATH Writing Course PSYO 1011/1012 or 1021/1022	Concepts in Chemistry (or equivalent) Principles of Biology (or BIOL 1020 & 1021) 6.0 credit hours (MATH 1060 and 3.0 credit hours from other math courses) 6.0 approved credit hours or SCI 1111 (Writing for the Sciences; 3 credit hours) Introduction to Psychology & Neuroscience
II	MICI 2100 MICI 2400 BIOL 2020 BIOL 2030 BIOC 2300 BIOC 2610 CHEM 2401 & 2402 NESC 2007 NESC 2470	Introductory Microbiology & Immunology (F) Laboratory Methods in Microbiology & Immunology (W) Cell Biology (F or W) Genetics (F or W) Introduction to Biochemistry (W) Introduction to Biochemistry Lab (W) Introductory Organic Chemistry 6.0 credit hours Neuroscience Principles and Methods (F) Systems Neuroscience (W)
III	MICI 3114 MICI 3115 MICI 3119 MICI 4XXX BIOC 3400 NESC 2570 NESC 2501 NESC 3XXX Electives	Virology (F) Immunology (F) Physiology of the Prokaryotic Cell (F) 3 credit hours Nucleic Acid Biochemistry & Molecular Biology (F) Introduction to Neuroscience II (W) Statistical Methods I (F) 3.0 credit hours chosen from approved NESC lab courses 6.0 credit hours
IV	MICI (or MICI approved) NESC 3XXX NESC 3/4XXX Electives	3.0 credit hours at or above the 3000 level 3.0 credit hours chosen from approved NESC lab courses 12.0 credit hours 12.0 credit hours

- consult academic advisors in both departments.

CO-OP DEGREE IN MICROBIOLOGY and IMMUNOLOGY

The Department of Microbiology and Immunology offers a Co-op Science experience to qualified students enrolled in any of our degree programs. Note that national regulations presently require that at least one academic term be replaced by a work term; thus, co-op programs take an extra semester to complete (in fact, most students prefer to spread their co-op program out over a total of 5 years). Work placements, beginning in the summer following completion of either second or third year studies, are in university or government research laboratories, diagnostic laboratories, or industry. These environments provide an excellent opportunity for students to learn cutting edge technologies, and to interact with working professionals; in so doing, co-op students may be better prepared for post-graduation employment in fields that are relevant to their educational training.

Application:

Interested students will normally apply to enroll in a co-op program by Apr. 30 of their first year of study. Acceptance requires a GPA of 3.30 (B⁺) or better; the same level of academic achievement will be required for continuance in the program; in addition, a grade of B⁺ is required in both **MICI 2100** and **MICI 2400**.

Format:

Co-op students participate in a required, non-credit professional development course (SCI 2800), taken in the Fall term of the 2nd year (mostly on-line, but with a few evening workshops); this is designed to prepare students for the first work-term. Each of the three required work terms will be the subject of a written report, a grade for which appears on the academic transcript, but is not worked into the GPA calculation. Work terms are arranged according to the schedule shown below, although other options are possible. Note that graduation with the Co-op designation requires that three work terms be completed successfully.

Year	September/December	January/April	May/August
1	Academic	Academic	Free
2	Academic	Academic	Work term 1
3	Academic	Academic	Work term 2
4	Work term 3	Academic	
4.5-5	Academic.	Academic (if graduating in May).	

N.B. Students cannot do an honours research project and a co-op work term concurrently. You are, however, allowed to take one course concurrently, with your supervisor's approval.

Contacts: D.B. Stoltz, Dept. of Microbiology and Immunology (dstoltz@dal.ca; 494-2590).
Courtney Ramey, Science Co-op office (Courtney.ramey@dal.ca; 494-3378).

Certificate in Genetics (revised March 2017)

Enrolment in the Certificate in Genetics program should be undertaken by students in their third year of studies when they are seeking approval of the research component by the Genetics Certificate Coordinator for their Degree Program. Completion of the Certificate will be shown on a student's transcript.

Note: It is the responsibility of students in the Certificate Program to complete the required courses, and to provide the Certificate Coordinator for the Degree Program with confirmation that the necessary courses have been taken by the end of the examination period in their final year of study. The Certificate will be awarded to students upon graduation from their undergraduate degree program.

Certificate Coordinators:

Biochemistry & Molecular Biology – Melanie Dobson (dobson@dal.ca) 494-7182, Tupper Rm 10J2

Biology – Debra Grantham (grantham@dal.ca) 494-2464, LSC Rm 6089

Medical Sciences – Ian Weaver (ian.weaver@dal.ca) 494-1133, LSC Rm 3340

Microbiology & Immunology – Lois Murray (lois.murray@dal.ca) 494-6933, Tupper Rm 10-L2

Psychology & Neuroscience – Ian Weaver (ian.weaver@dal.ca) 494-1133, LSC Rm 3340

Certificate requirements:

A minimum grade of **B-** is required in **four** mandatory courses:

BIOL 2020.03: Cell Biology

BIOL 2030.03: Genetics and Molecular Biology

BIOC 2300.03: Introduction to Biochemistry

BIOC 3400.03: Nucleic Acid Biochemistry and Molecular Biology

A minimum grade of **B-** in **12-credit hours** chosen from the following list:

At least 6 credit hours must be at the 4000 level.

BIOL 2040.03: Evolution

BIOL 3036.03: Transgenic Organisms

BIOL/MARI 3042.03: Molecular Ecology

BIOL 3044.03: Ecological Genetics

BIOL 3102.03: Microbial Eukaryotes: Biodiversity and Evolution

MICI 3114.03: Virology

MICI 3119.03: Physiology of the Prokaryotic Cell

NESC/PSYO 3670.03: Genes, Brain and Behavior

BIOC 4010.03: Bioinformatics

BIOC/MICI 4027.03: Molecular Mechanisms of Cancer

MICI 4033.03: Advanced Microbial Genetics

MICI 4113.03: Advanced Topics in Molecular and Medical Virology

BIOC 4403.03: Genes and Genomes

BIOC 4404.03: Gene Expression

BIOC 4501.03: Medical Biotechnology

BIOC 4835.03/BIOL 4035.03: Human Genetics

A minimum of grade B- in 3 credit hours or more of independent research on a topic involving microbial genetics, molecular genetics, transmission genetics or population genetics. Co-op Work Terms are not applicable. The research topic must be approved by the Certificate Coordinator for your Degree Program prior to the start of the research course by submitting your research proposal to the Certificate Coordinator. If you change research topics or approaches these changes must be approved by the Coordinator to ensure eligibility for the Certificate.

UNDERGRADUATE RESEARCH PRIZE

The Faculty of Science offers an **Undergraduate Research Prize** to students who have made a substantial commitment and contribution to research during their undergraduate programs. The prize is a non-competitive, non-monetary recognition of learning and contribution through participation in research outside of the classroom. The prize is awarded annually upon graduation to eligible students and is not based on GPA. The **Undergraduate Research Prize** will be noted on the student's academic transcript.

Eligibility criteria:

- 32 weeks of full time (or equivalent) research experience while registered in a BSc 20 credit Major or BSc Honours Faculty of Science program at Dalhousie University
- Research conducted as part of a course (e.g., special topics, co-op, experiential learning courses) or as part of an honours project is not eligible

How to apply:

- Submit a completed application form (student) to your Departmental contact person
- Ask each of the Faculty members who supervised your research to provide a **Faculty support letter**. Ensure that the letter reaches your Departmental contact person. You may collect the letters, or Faculty member may send the letters directly to the contact person.
- **Deadline** for application and letters of support: **April 1st of your graduating year.**

Department contact person:

Biochemistry & Molecular Biology	C. Slamovits	Claudio.Slamovits@Dal.Ca
Biology/Marine Biology	A. Simpson	Alastair.Simpson@Dal.Ca
Chemistry	M. Obrovac	mark.obrovac@dal.ca
Earth Sciences	I. Coutand	icoutand@dal.ca
Economics	C. Ntantamis	christos.ntantamis@dal.ca
Environmental Science	A. Mui	amy.mui@dal.ca
Mathematics	D. Pronk	pronk@mathstat.dal.ca
Microbiology & Immunology	L. Murray	Lois.Murray@dal.ca
Oceanography	D. Barclay	dbarclay@dal.ca
Physics	I. Folkins	ian.folkins@dal.ca
Psychology & Neuroscience	S. Jacques	sophie.jacques@dal.ca
Statistics	B. Smith	bruce.smith@dal.ca

RESEARCH OPPORTUNITIES in BACTERIOLOGY/GENETICS

The importance of bacterial infections as a threat to human health is immense. Infectious diseases as a whole (including those caused by bacteria) are still the number one cause of death in the world; therefore, the study of infectious disease is of great importance for human health and well being.

Bacteriology Research Interests

The infectious process that bacterial pathogens follow to cause disease consists of several defined steps of:

- 1) Initial host-pathogen interaction
- 2) Colonization of the host
- 3) Evasion of host-defense mechanisms
- 4) Damage to the host

The study of the above steps constitutes the basis for teaching and research in the area of bacterial pathogenesis, with two main objectives: to understand the underlying mechanisms of infectious diseases and to find new ways to prevent or cure them. Faculty members within our department who teach different aspects of bacterial pathogenesis (from either a clinical or basic science perspective) carry out active research covering all the steps of the infectious process listed above. In fact, our department has had, and continues to have, notable contributions to this field of research: from 1) confirming that listeriosis is a food-borne disease, 2) elucidating the molecular basis of resistance of the ulcer-causing bacterium to the antibiotic metronidazole and 3) discovering a new toxin in the bacterium that causes antibiotic-associated diarrhea, to 4) developing new vectors for effective and safe vaccines.

The Microbiology and Immunology department has strong links with the university-affiliated hospitals (QEII and IWK-Grace Health Research Centers). In addition, the Dalhousie Infectious Diseases Research Alliance (DIDRA) provides an environment in which researchers involved in the study of infectious diseases can share ideas, resources and expertise.

Bacteriology Course Selections

Are you interested in this area of Microbiology? You may want to consider the following courses: **MICI 4033** (Advanced Microbial Genetics), **MICI 4118** (Molecular Bacterial Pathogenesis), **MICI 4218** (Clinical Microbiology), **BIOC 4010** (Bioinformatics), **BIOC 4403** (Genes and Genomes), **BIOC 4404** (Gene Expression), and **BIOC 4501** (Medical Biotechnology).

At the Honours level, students are required to conduct a novel research thesis topic under the supervision of a faculty member (**MICI 4901/4902**) (Honours Research and Thesis).

Faculty involved in bacterial pathogenesis (Drs. Cheng, Davidson, Halperin, S. Lee, Y-H. Li, Thomas and Rohde) would be pleased to provide you with details of their own research interests and potential research projects.

Genetics Research Interests

Classical genetics is the study of how traits (genes) are transmitted from one generation to another. With the development of recombinant DNA technologies the field of genetics has expanded to encompass every aspect of biology. Modern genetics (or molecular genetics) has evolved into an experimental approach that provides the researcher with the capacity to isolate and modify genes, determine the underlying function of gene products and manipulate the genetic material of cells to not only understand fundamental issues of biology but also to create tools that can be used to improve human health. Although the application of molecular genetics now underpins essentially all aspects of biological research several within the Department of Microbiology and Immunology have focused on the use of a combination of classical and molecular genetics to explore fundamental issues of gene expression, development, cell behaviour and host/pathogen interactions.

For some of these molecular genetics labs, an experimental system of choice is the budding yeast, *Saccharomyces cerevisiae*, a unicellular eukaryote. One of the most exciting findings of the past few years has been the appreciation that essentially all cells (from yeast to humans) display a remarkable conservation of function so that the molecular and genetic facility of yeast can be exploited to investigate basic cellular activities of all eukaryotic cells. Thus, labs within the Department use yeast to explore issues such as control of cell proliferation, development and morphogenesis, and the regulation of gene expression.

Genetics Course Selections

The microbial genetics curriculum in the Department is a gradually staged exposure to concepts in genetics, of increasing sophistication and conceptualization with the more advanced courses. An undergraduate's first exposure to genetics is usually in second year through the Biology department with **BIOL 2020**, and **BIOL 2030**, and the Microbiology and Immunology department with **MICI 2100** (Introductory Microbiology and Immunology). Third year students then take **BIOC 3400** (Nucleic Acid Biochemistry and Molecular Biology) and **MICI 3119** (Physiology of the Prokaryotic Cell). Advanced courses such as **MICI 4033** (Advanced Microbial Genetics), **MICI 4027** (Molecular Mechanisms of Cancer), **BIOC 4010** (Bioinformatics), **BIOC 4403** (Genes and Genomes), **BIOC 4404** (Gene Expression), **BIOC 4501** (Medical Biotechnology), and **BIOC 4835** (Human Genetics) round out the offerings.

At the Honours level, students are required to conduct a novel research thesis topic under the supervision of a faculty member (**MICI 4901/4902**) (Honours Research and Thesis).

Faculty involved in microbial and/or molecular genetics (Drs. Barrett, Berman, Cheng, Davidson, Langille, LeBlanc, Murray, Rohde, Thomas, and Van Limbergen) would be pleased to provide you with details of their own research interests and potential research projects. A complete list of faculty is at the departmental website.

Genetics Certificate (see pg 14)

RESEARCH in IMMUNOLOGY

Immunology research, teaching, and interest have mushroomed in the Department over the past decade. Main areas of interest of the faculty include 1) studying the mechanisms of inflammation, 2) cancer research, 3) transplantation, and 4) host defense to infectious diseases. The common interests among faculty members have led to the establishment of the “Cancer Immunotherapy Research Group” and the “Dalhousie Inflammation Group”. Many immunologists also participate in the “Dalhousie Infectious Diseases Research Alliance”. Some faculty hold appointments in clinical departments and the links to the clinical setting are readily established.

Research Interests

Faculty specifically study mechanisms of inflammation, immunity to cancer, transplant rejection, immunomodulation by herbal medicines, mechanisms of leukocyte infiltration into sites of (lung and arthritis) inflammation, aspects of host defense to viral and bacterial pathogens, and vaccine development. All the faculty support student trainees, who may do research in the lab as Honours or Major students. Research experience in the laboratory and the current contents of the Immunology course offerings prepare students for jobs in the biomedical/pharmaceutical sciences, or for further study at the graduate levels of M.Sc. and Ph.D.

Immunology Course Selections

The Immunology curriculum in the department is a gradually staged exposure to concepts in Immunology that increases in sophistication and conceptualization with the more advanced courses. An undergraduate’s first exposure to Immunology is in **MICI 2100** (Introductory Microbiology and Immunology), involving a series of introductory lectures. Following **MICI 2100**, interested students may register in **MICI 2115** (Human Organs and Tissues: Infection and Immunity) in the same year, then take **MICI 3115** (Immunology) in the following year. Following **MICI 3115**, students are recommended to take **MICI 4115** (Medical Immunology), which is their first introduction to immunological experimentation as represented in publications. This course consists of lectures based on recent research publications chosen by the course coordinator. **MICI 4115** prepares students for the remaining senior level undergraduate courses: **MICI 4100** (Processes and Mediators of Inflammation), **MICI 4302**, (Molecular Immunology), and **MICI 4116** (Topics in Mucosal Immunology), all of which require student presentations of current literature. Students may also consider taking **PSYO/NESC 3180** (Psychoneuroimmunology/Ecoimmunology).

At the Honours level, students are required to conduct a novel research thesis topic under the supervision of a faculty member (**MICI 4901/4902**) (Honours Research and Thesis). Faculty involved in immunology (Drs. Barret, Bezuhly, Boudreau, Cheng, Derfalvi, Gujar, Halperin, Hoskin, B. Johnston, A. Kelvin, D. Kelvin, Legare, Lehmann, Liwski, Makrigiannis, Marcato, Marshall, Stadnyk, Stanford, Van Limbergen and Wang) would be pleased to provide you with details of their own research interests and potential research projects. A complete list of faculty is at the departmental website.

RESEARCH in VIROLOGY

Virology has had a long and distinguished history at this University; in fact, Dalhousie's first Ph.D. degree was earned, in 1959, by a virology student. In more recent years, virologists associated with this Department have, among other things: made a significant contribution to the province's decision to ban aerial spraying of chemical pesticides (this resulted from crucially important research into the cause of Reye's Syndrome); described and named an entirely new, and very large, family of viruses; discovered new cell-fusing polypeptides with potential application in the field of gene therapy and viral occlusion; and developed sophisticated molecular tools for the diagnosis of important human pathogens.

Research Interests

Virology constitutes a major focus on teaching and research within the Department; in fact, ours represents the only such focus east of Montreal. Current areas of research include: the reoviruses (Dr. Duncan), which constitute one of the largest and certainly the most diverse group of viruses known; emerging viral pathogens, such as Zika (Dr. A. Kelvin and Dr. D. Kelvin); influenza virus surveillance, diagnosis and pathogenesis (Drs. Hatchette, A. Kelvin and D. Kelvin, D. Khapersky, and C. McCormick); and Kaposi's sarcoma-associated herpesvirus, a human tumour virus (Dr. McCormick). Dalhousie virologists collaborate extensively with scientists based elsewhere, including China.

Virology Course Selections

Teaching in virology begins with **MICI 2100** (Introductory Microbiology and Immunology), followed by **MICI 3114** (Virology) and **MICI 4114** (Advanced Topics in Molecular and Medical Virology). Students having a particular interest in virology will profit from exposure to required and elective courses in cell biology, immunology and biochemistry, emerging upon graduation with a solid foundation in the discipline. Advice regarding academic programs in general, and academic virology in particular, (including the Co-op Program) can be obtained from Dr. Stoltz.

At the Honours level, students carry out a research project under the supervision of a faculty member (**MICI 4901/4902**: Honours Research and Thesis).

Faculty involved in virology (Drs. Anderson, Barrett, Duncan, Hatchette, A. Kelvin, D. Kelvin, Khapersky, McCormick, and Richardson) would be pleased to provide you with details of their own research interests and potential research projects. A complete list of faculty is at the departmental website.

University Policies and Statements

Academic Integrity

At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student, you are required to demonstrate these values in all of the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity.

Information: https://www.dal.ca/dept/university_secretariat/academic-integrity.html

Accessibility

The Advising and Access Services Centre is Dalhousie's centre of expertise for student accessibility and accommodation. The advising team works with students who request accommodation as a result of a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (Canada and Nova Scotia).

Information: https://www.dal.ca/campus_life/academic-support/accessibility.html

Student Code of Conduct

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner—perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution.

Code: https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html

Diversity and Inclusion – Culture of Respect

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness

Statement: <http://www.dal.ca/cultureofrespect.html>

Recognition of Mi'kmaq Territory

Mi'kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, Dalhousie University would like to acknowledge that the University is on Traditional counsel and support. Visit or e-mail the Indigenous Student Centre (1321 Edward St) (elders@dal.ca).

Information: https://www.dal.ca/campus_life/communities/indigenous.html

Important Dates in the Academic Year (including add/drop dates)

https://www.dal.ca/academics/important_dates.html

University Grading Practices

https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html

Missed or Late Academic Requirements due to Student Absence (policy)

https://www.dal.ca/dept/university_secretariat/policies/academic/missed-or-late-academic-requirements-due-to-student-absence.html

Student Resources and Support

Advising

General Advising: https://www.dal.ca/campus_life/academic-support/advising.html

Science Program Advisors: <https://www.dal.ca/faculty/science/current-students/academic-advising.html>

Indigenous Student Centre: https://www.dal.ca/campus_life/communities/indigenous.html

Black Students Advising Centre: https://www.dal.ca/campus_life/communities/black-student-advising.html

International Centre: https://www.dal.ca/campus_life/international-centre/current-students.html

Academic supports

Library: <https://libraries.dal.ca/>

Writing Centre: https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html

Studying for Success: https://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html

Copyright Office: <https://libraries.dal.ca/services/copyright-office.html>

Fair Dealing Guidelines <https://libraries.dal.ca/services/copyright-office/fair-dealing.html>

Other supports and services

Student Health & Wellness Centre: https://www.dal.ca/campus_life/health-and-wellness/services-support/student-health-and-wellness.html

Student Advocacy: <https://dsu.ca/dsas>

Ombudsperson: https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html

Safety

Biosafety: <https://www.dal.ca/dept/safety/programs-services/biosafety.html>

Chemical Safety: <https://www.dal.ca/dept/safety/programs-services/chemical-safety.html>

Radiation Safety: <https://www.dal.ca/dept/safety/programs-services/radiation-safety.html>

Scent-Free Program: <https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html>