

# **Undergraduate Student Handbook**

## ***Department of Microbiology & Immunology***

January 2025



**DALHOUSIE  
UNIVERSITY**

# Contact Us

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# Introduction and welcome

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 activities pursued by faculty members.

## MICI DEPARTMENT Undergraduate ADVISORS:



**Dr. Nikhil Thomas**  
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**Chair Undergraduate Committee**



**Dr. Lois Murray**  
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**Senior Instructor**



**Dr. Jun Wang**  
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**Dr. John Rohde**  
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**Dr. Andrew Stadnyk**  
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**Honours Thesis Coordinator**

The MICI Department is committed to Equity, Diversity, and Inclusion policies and initiatives at Dalhousie University. We strive to provide a welcoming, supportive, and inclusive experience to all students and the greater university community.

# For All MICI Degree 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. 7) are those provided by other Depts., but which count as MICI credits (i.e. are considered as being in the discipline).
- **entry into certain 3000-level MICI courses** (e.g. MICI 3114) will require grades of at least **B- in prerequisite courses** (e.g. MICI 2100).
- 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 and above the 3000 level are required.

## Optional MICI and MICI-approved courses

- **2115** Human Organs and Tissues (W)  
(cross-listed PATH 2115, offered by Dept. Pathology)
- **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)
- **4119** Host Pathogen Interactions (F)
- **4218** Clinical Microbiology (W)
- **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)

## **MICI approved courses in Biology (BIOL)**

- **2004** Diversity of Life II (W)
- **3037** Life Rewritten: Gene Editing (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: Degree core (required) courses are not listed here. For core courses see next pages for specific degree programs (Honours, Combined Honours, Double Major, Minor).

# 1-Honours Degree in MICI

Year	Courses	Description
I	<b>CHEM 1011 &amp; 1012</b> <b>BIOL 1010 &amp; 1011</b> <b>MATH</b> <b>Writing Course</b>  <b>Electives</b>	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 1505 (Writing for the Sciences; 3 credit hours) 6.0 credit hours
II	<b>MICI 2100</b> <b>MICI 2400</b> <b>BIOL 2020</b> <b>BIOL 2030</b> <b>BIOC 2300</b> <b>BIOC 2610</b> <b>CHEM 2401 &amp; 2402</b> <b>Electives</b>	Introductory Microbiology & Immunology (F, online W and S) Laboratory Methods in Microbiology & Immunology (W) Cell Biology (F or W) Genetics and Molecular Biology (F or W) Introduction to Biochemistry (W) Introduction to Biochemistry Lab (W) Introductory Organic Chemistry 6.0 credit hours
III	<b>MICI 3114</b> <b>MICI 3115</b> <b>MICI 3119</b> <b>BIOC 3400</b> <b>MICI 4XXX</b> <b>Electives</b>	Virology (F) Immunology (F) Physiology of the Prokaryotic Cell (F) Nucleic Acid Biochemistry & Molecular Biology (F) 3.0 credit hours 15 credit hours
IV	<b>MICI 4901/4902</b> <b>MICI &amp;/or approved</b> <b>courses Electives</b>	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. 4).
- 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	<b>CHEM 1011 &amp; 1012</b> <b>BIOL 1010 &amp; 1011</b> <b>MATH</b> <b>Writing Course</b>  <b>Electives</b>	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 1505 (Writing for the Sciences; 3 credit hours) 6.0 credit hours
II	<b>MICI 2100</b> <b>MICI 2400</b> <b>BIOL 2020</b> <b>BIOL 2030</b> <b>BIOC 2300</b> <b>BIOC 2610</b> <b>CHEM 2401 &amp; 2402</b> <b>Electives</b>	Introductory Microbiology & Immunology (F, online W and S) Laboratory Methods in Microbiology & Immunology (W) Cell Biology (F or W) Genetics and Molecular Biology (F or W) Introduction to Biochemistry (W) Introduction to Biochemistry Lab (W) Introductory Organic Chemistry 6.0 credit hours
III	<b>MICI 3114</b> <b>MICI 3115</b> <b>MICI 3119</b> <b>BIOC 3400</b> <b>BIOC 3700</b> <b>MICI 4XXX</b> <b>BIOC 4XXX</b>  <b>Electives</b>	Virology (F) Immunology (F) Physiology of the Prokaryotic Cell (F) 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	<b>MICI 4901/4902</b> <b>MICI &amp;/or approved</b> <b>courses Electives</b>	Honours Research & Thesis 9.0 credit hours 15 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. This includes a minimum of 18 credit hours at or above the 3000 level in each subject (this applies to all combined honours degrees).
- honours thesis research can be carried out in either Dept.
- some workload flexibility is possible in years III and IV. - for additional information, see p. 5.

# 3 – Combined Honours Degree in MICI and BIOL

Year	Courses	Description
I	<b>CHEM 1011 &amp; 1012</b> <b>BIOL 1010 &amp; 1011</b> <b>MATH</b> <b>Writing Course</b>  <b>Electives</b>	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 1505 (Writing for the Sciences; 3 credit hours) 6.0 credit hours
II	<b>MICI 2100</b> <b>MICI 2400</b> <b>BIOL 2020</b> <b>BIOL 2030</b> <b>BIOC 2300</b> <b>BIOC 2610</b> <b>CHEM 2401 &amp; 2402</b> <b>BIOL 2040</b> <b>BIOL 2060</b>	Introductory Microbiology & Immunology (F, online W and S) Laboratory Methods in Microbiology & Immunology (W) Cell Biology (F or W) Genetics and Molecular Biology (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	<b>BIOL 2003</b> <b>BIOL 2004</b> <b>MICI 3114</b> <b>MICI 3115</b> <b>MICI 3119</b> <b>BIOC 3400</b> <b>BIOC 3XXX/4XXX</b> <b>BIOL 3050, 3078, 3079</b> <b>MICI 4XXX</b> <b>Electives</b>	Animal Diversity (F) Diversity of Plants and Animals (W) Virology (F) Immunology (F) Physiology of the Prokaryotic Cell (F) Nucleic Acid Biochemistry & Molecular Biology (F) 3.0 credit hours Either BIOL 3050 and 3078, or 3079 3.0 credit hours 3.0 credit hours
IV	<b>MICI 4901/4902</b> <b>MICI &amp;/or approved</b> <b>courses Electives</b>	Honours Research & Thesis 9.0 credit hours 15 credit hours

- if most 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.
- 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).
- MATH 1060 is now a prerequisite for BIOL 2060.
- for additional information, see p. 5.

# 4 – Major Degree in Microbiology & Immunology - MICI

Year	Courses	Description
I	<b>CHEM 1011 &amp; 1012</b> <b>BIOL 1010 &amp; 1011</b> <b>MATH</b> <b>Writing Course</b>  <b>Electives</b>	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 1505 (Writing for the Sciences; 3 credit hours) 6.0 credit hours
II	<b>MICI 2100</b> <b>MICI 2400</b> <b>BIOL 2020</b> <b>BIOL 2030</b> <b>BIOC 2300</b> <b>BIOC 2610</b> <b>CHEM 2401 &amp; 2402</b> <b>Electives</b>	Introductory Microbiology & Immunology (F, online W and S) Laboratory Methods in Microbiology & Immunology (W) Cell Biology (F or W) Genetics and Molecular Biology (F or W) Introduction to Biochemistry (W) Introduction to Biochemistry Lab (W) Introductory Organic Chemistry 6.0 credit hours
III	<b>MICI 3114</b> <b>MICI 3115</b> <b>MICI 3119</b> <b>BIOC 3400</b> <b>MICI 4XXX</b> <b>Electives</b>	Virology (F) Immunology (F) Physiology of the Prokaryotic Cell (F) Nucleic Acid Biochemistry & Molecular Biology (F) 3.0 credit hours 15 credit hours
IV	<b>MICI &amp;/or approved courses</b> <b>Electives</b>	3.0 credit hours above the 2000 level  24 credit hours

- students must complete a minimum of 42 credit hours above the 1000 level in the discipline, including a minimum of 18 credit hours at or above the 3000 level. 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 Major Degree in MICI and BIOC

Year	Courses	Description
I	<b>CHEM 1011 &amp; 1012</b> <b>BIOL 1010 &amp; 1011</b> <b>MATH</b> <b>Writing Course</b>  <b>Electives</b>	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 1505 (Writing for the Sciences; 3 credit hours) 6.0 credit hours
II	<b>MICI 2100</b> <b>MICI 2400</b> <b>BIOL 2020</b> <b>BIOL 2030</b> <b>BIOC 2300</b> <b>BIOC 2610</b> <b>CHEM 2401 &amp; 2402</b> <b>Electives</b>	Introductory Microbiology & Immunology (F, online W and S) Laboratory Methods in Microbiology & Immunology (W) Cell Biology (F or W) Genetics and Molecular Biology (F or W) Introduction to Biochemistry (W) Introduction to Biochemistry Lab (W) Introductory Organic Chemistry 6.0 credit hours
III	<b>MICI 3114</b> <b>MICI 3115</b> <b>MICI 3119</b> <b>BIOC 3300</b> <b>BIOC 3400</b> <b>BIOC 3700</b> <b>Electives</b>	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	<b>MICI &amp;/or approved courses</b> <b>BIOC</b> <b>Electives</b>	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; this includes a minimum of 18 credit hours at or above the 3000 level in each of the two subjects.
- 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 Major Degree in MICI and BIOL

Year	Courses	Description
I	<b>CHEM 1011 &amp; 1012</b> <b>BIOL 1010 &amp; 1011</b> <b>MATH</b> <b>Writing Course</b>  <b>Electives</b>	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 1505 (Writing for the Sciences; 3 credit hours) 6.0 credit hours
II	<b>MICI 2100</b> <b>MICI 2400</b> <b>BIOL 2020</b> <b>BIOL 2030</b> <b>BIOL 2040</b> <b>BIOL 2003, 2004, 2060</b> <b>BIOC 2300</b> <b>CHEM 2401 &amp; 2402</b>	Introductory Microbiology & Immunology (F, online W and S) Laboratory Methods in Microbiology & Immunology (W) Cell Biology (F or W) Genetics and Molecular Biology (F or W) Evolution (F or W) 6.0 credit hours Introduction to Biochemistry Lab (W) Introductory Organic Chemistry
III	<b>BIOC 2610</b> <b>BIOL 3XXX (or above)</b> <b>MICI 3114</b> <b>MICI 3115</b> <b>MICI 3119</b> <b>BIOC 3400</b> <b>MICI 4XXX</b> <b>Electives</b>	Introduction to Biochemistry (W) 9.0 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	<b>MICI &amp;/or approved courses</b> <b>BIOL Electives</b>	6.0 credit hours, including 3 at or above the 3000 level  9.0 credit hours at or above the 3000 level 15.0 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; this includes a minimum of 18 credit hours at or above the 3000 level in each of the two subjects.
- MATH/STAT 1060 is now a prerequisite for BIOL 2060.

# 7– Double Major Degree in MICI and Neuroscience

Year	Courses	Description
I	<b>CHEM 1011 &amp; 1012</b> <b>BIOL 1010 &amp; 1011</b> <b>MATH</b> <b>Writing Course</b>  <b>PSYO 1011/1012 or</b> <b>1021/1022</b>	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 1505 (Writing for the Sciences; 3 credit hours) Introduction to Psychology & Neuroscience
II	<b>MICI 2100</b> <b>MICI 2400</b> <b>BIOL 2020</b> <b>BIOL 2030</b> <b>BIOC 2300</b> <b>BIOC 2610</b> <b>CHEM 2401 &amp; 2402</b>  <b>NESC 2007*</b> <b>NESC 2470</b>	Introductory Microbiology & Immunology (F, online W and S) Laboratory Methods in Microbiology & Immunology (W) Cell Biology (F or W) Genetics and Molecular Biology (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	<b>MICI 3114</b> <b>MICI 3115</b> <b>MICI 3119</b> <b>MICI 4XXX</b> <b>BIOC 3400</b> <b>NESC 2570</b> <b>NESC 2501</b> <b>NESC 3XXX</b> <b>Electives</b>	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	<b>MICI (or MICI approved)</b> <b>NESC 3XXX</b> <b>NESC 3/4XXX</b> <b>Electives</b>	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

- 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; this includes a minimum of 18 credit hours at or above the 3000 level in each of the two subjects.
- 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 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; that said, MICI 2400 can be deferred until 3rd year.

## **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 typically 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	Fall Term (Sep-Dec)	Winter Term (Jan -Apr)	Summer Term (May-Aug)
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. Students are allowed to take one course concurrently, with your Co-op supervisor's approval.

Contacts: Dr. Craig McCormick, Dept. of Microbiology and Immunology, [Craig.McCormick@dal.ca](mailto:Craig.McCormick@dal.ca)



# Certificate in Genetics

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.

Interested students are asked to please review the **Certificate in Genetics checklist** and complete and submit the **research topic submission form** to the genetics certificate coordinators.

## Certificate Coordinators:

Microbiology & Immunology – Lois Murray (lois.murray@dal.ca), 902-494-6933, Tupper Rm 7-L

## Certificate requirements:

### 1. A minimum grade of **B-** is required in **three mandatory courses**:

BIOL 2030.03: Genetics and Molecular Biology

BIOC 2300.03: Introduction to Biochemistry

BIOC 3400.03: Nucleic Acid Biochemistry and Molecular Biology

### 2. Other required courses

CHEM 2401.03 Introductory Organic Chemistry: Structure, Concepts of Mechanisms and Spectroscopy

CHEM 2402.03 Introductory Organic Chemistry: Reactivity of Functional Groups

### 3. 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.**

#### **2000 level**

BIOL 2040.03: Evolution

#### **3000 level**

BIOL 3037.03: Life Rewritten: Applications and Implications of Gene Editing and Synthetic Biology

BIOL/MARI 3042.03: Molecular Ecology

BIOL 3044.03: Ecological Genetics

BIOL 3046.03: Molecular Evolution

MICI 3114.03: Virology

NESC/PSYO 3670.03: Genes, Brain and Behavior

#### **4000 level**

BIOC 4010.03: Bioinformatics

BIOC/MICI 4027.03: Molecular Mechanisms of Cancer

MICI 4033.03: Advanced Microbial Genetics

MICI 4114.03: 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

NESC 4670.03: Behavioral Neuro(epi)genetics and Genomics

**4. A minimum grade of **B-** in **3 credit hours (or more)** of independent research on a topic involving microbial genetics, molecular genetics, genomics, transmission genetics or population genetics (See topics that qualify and criteria below after Checklist). **Note:** *Co-op Work Terms are not applicable.* Eligible research courses are listed below.**

- BIOC 4001.03 Special Topics in Biochemistry
- BIOC 4604.03 and BIOC 4605.03 Research Project I and II
- BIOL/MARI 4806.03 or 4807.03 Independent Research I (or II) in Biology or Marine Biology
- BIOL/MARI 4901.03 and 4902.03 Honours Research and Thesis I and II
- MICI 4701.03 or 4702.03 Advanced Topics in Microbiology and Immunology
- MICI 4703.03 and 4704.03 Directed Research Project I and II
- MICI 4901.03 and 4902.03 Honours Research and Thesis
- NESC/PSYO 3100/3101 Independent Research
- NESC/PSYO 4501.03 and 4502.03 Honours Thesis (formerly 4500X/Y.06)
- SCIE 4101.03 and 4102.03 Directed Project in Medical Sciences (formerly SCIE 4100X/Y.06)
- SCIE 4901.03 and 4902.03 Honours Research and Thesis (formerly SCIE 4900X/Y.06)



# 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 Point of Contact

Microbiology & Immunology

Dr. Denys Khaperskyy

D.Khaperskyy@dal.ca

For more information, please visit [here](#) (NetID login required)



# RESEARCH OPPORTUNITIES

## 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 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 I3V (Infection, Immunity Inflammation & Virology) Wave I Team provides an environment in which researchers involved in the study of infectious diseases collaborate, share 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 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. Thomas, Cheng, Rohde, LeBlanc and Lithgow) 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 17 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 Cheng, Langille, LeBlanc, Murray, Rohde, Thomas) would be pleased to provide you with details of their own research interests and potential research projects. A complete list of Faculty is found on the departmental website.

## **Genetics Certificate (see pg 16)**

# RESEARCH OPPORTUNITIES

## 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. 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. Barrett, Bezuhly, Boudreau, Cheng, Derfalvi, Gujar, Halperin, Hoskin, B. Johnston, D. Kelvin, Legare, Lehmann, Liwski, Makrigiannis, Marcato, Marshall, Stadnyk, Stanford, 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 OPPORTUNITIES

## 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 oncolysis; 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. Current areas of research include: the reoviruses (Dr. Duncan), emerging viral pathogens, such as influenza and SARS-CoV-2 (Dr. Kelvin); influenza virus surveillance, diagnosis and pathogenesis (Drs. Hatchette, Kelvin, Khaperskyy, McCormick); and Kaposi's sarcoma-associated herpesvirus, a human tumour virus (Dr. McCormick).

### Immunology Course Selections

Teaching in virology begins with **MICI 2100** (Introductory Microbiology and Immunology), followed by **MICI3114** (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. McCormick.

At the Honours level, students carry out a research project under the supervision of a faculty member (**MICI4901/4902**: Honours Research and Thesis).

Faculty involved in virology (Dr. Barrett, Duncan, Gillgrass, Hatchette, Kelvin, Khaperskyy, 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 STUDENT RESOURCES

## **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](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](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](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](mailto:elders@dal.ca)).

Information: [https://www.dal.ca/campus\\_life/communities/indigenous.html](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](https://www.dal.ca/academics/important_dates.html) University Grading Practices

[https://www.dal.ca/dept/university\\_secretariat/policies/academic/grading-practices-policy.html](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-requirementsdue-to-student-absence.html](https://www.dal.ca/dept/university_secretariat/policies/academic/missed-or-late-academic-requirementsdue-to-student-absence.html)

## **Advising**

- General Advising: [https://www.dal.ca/campus\\_life/academic-support/advising.html](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](https://www.dal.ca/campus_life/communities/indigenous.html)
- Black Students Advising Centre: [https://www.dal.ca/campus\\_life/communities/black-studentadvising.html](https://www.dal.ca/campus_life/communities/black-studentadvising.html)
- International Centre: [https://www.dal.ca/campus\\_life/communities/black-student-advising.html](https://www.dal.ca/campus_life/communities/black-student-advising.html)

## **Academic supports**

- Library: <https://libraries.dal.ca/>
- Writing Centre: [https://www.dal.ca/campus\\_life/academic-support/writing-and-study-skills.html](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](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/servicessupport/student-health-and-wellness.html](https://www.dal.ca/campus_life/health-and-wellness/servicessupport/student-health-and-wellness.html)
- Ombudsperson: [https://www.dal.ca/campus\\_life/safety-respect/student-rights-and-responsibilities/whereto-get-help/ombudsperson.html](https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/whereto-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/scentfree.html>