



# Department of Microbiology & Immunology



## Undergraduate Handbook 2020-2021



**McGill**



**WELCOME TO THE  
DEPARTMENT OF  
MICROBIOLOGY AND  
IMMUNOLOGY!**

**[www.mcgill.ca/undergrad.microimm@mcgill.ca](http://www.mcgill.ca/undergrad.microimm@mcgill.ca)**

This handbook is designed to provide you with information about undergraduate courses and programs offered in the Department of Microbiology and Immunology at McGill University. The Department offers three programs of study: The Liberal program, the Major program, and the Honours program.

The Administrative Offices are located on the 5th floor of the Duff Medical Building on University Street. Full-time faculty members have laboratories at this location, while associated staff are in nearby research institutes and teaching hospitals.

You are welcome to come and talk to our faculty members and to meet other students. We are here to help you and hope you will enjoy and be enriched by the courses you may take with us.

**For specific enquiries, please contact the Student Affairs Officer,**  
Room 511,  
3775 University Street,  
Montreal, Quebec, H3A 2B4  
Telephone: (514) 398-3915  
**[Undergrad.microimm@mcgill.ca](mailto:Undergrad.microimm@mcgill.ca)**

**BIENVENUE AU  
DÉPARTEMENT DE  
MICROBIOLOGIE ET  
IMMUNOLOGIE!**

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Ce guide vous renseignera sur les cours et programmes de premier cycle offerts par le Département de Microbiologie et Immunologie de l'Université McGill. Le Département offre trois programmes d'études: le programme "Liberal", le programme "Major" et le programme "Honours".

Les services administratifs sont situés au 5<sup>e</sup> étage du Pavillon Duff Médicale, rue Université. Les membres du corps enseignant à plein temps ont leur laboratoire dans ce pavillon et les membres associés travaillent dans les instituts de recherche et hôpitaux affiliés.

Vous êtes invité(e)s à venir rencontrer les professeurs et les étudiants du Département. Nous sommes là pour vous aider et nous croyons que les cours que vous suivrez sauront vous intéresser et approfondir vos connaissances.

**Pour plus de renseignements, veuillez-vous adresser à l'agent des affaires étudiantes,**  
Bureau 511,  
3775, rue Université,  
Montréal, Québec, H3A 2B4  
Téléphone: (514) 398-3915  
**[Undergrad.mciroimm@mcgill.ca](mailto:Undergrad.mciroimm@mcgill.ca)**

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## SCOPE OF MICROBIOLOGY AND IMMUNOLOGY

**Microbiology** is the study of the microorganisms such as bacteria, viruses, unicellular eukaryotes and parasites. Microorganisms play an important role in human and animal disease, food production (bread, cheese, wine), decay and spoilage, contamination and purification of water and soil, production and the recycling of food in lakes and oceans.

Microbiologists study these tiny, self-replicating machines in an attempt to understand the basic principles of life: growth, metabolism, cell division, control of gene expression, response to environmental stimuli. Microbiologists are also concerned with controlling or harnessing microorganisms for the benefit of people, by isolating antibiotics or producing vaccines to protect against disease and by developing and perfecting microorganisms for industrial uses.

**Immunology** is the study of the molecular and cellular basis of host resistance and immunity to external agents such as pathogenic microorganisms. Immunologists attempt to understand the mechanisms by which the body recognizes foreign antigens, generates appropriate antibodies to an enormously diverse spectrum of antigens, and sequesters and kills invading microorganisms.

Their discoveries lead to better understanding of vaccination against disease, transfusions and organ transplants, allergies, cancer, autoimmune diseases and immune-deficiency diseases such as AIDS. Immunologists have developed monoclonal antibodies as highly specific tools in diagnosis and treatment of disease. Antibodies may soon be used in conjunction with antibiotics or chemical agents as specific "silver bullets" to attack microbes and cancers.

The disciplines of microbiology and immunology are natural partners in research, and both fields use the modern methods of cell biology, molecular biology and genetics to study basic life processes. The Department of Microbiology and Immunology includes scientists who study microbial physiology and genetics, microbial pathogenesis, molecular virology, cellular and molecular immunology, and parasitology. Students registered in the Department therefore are exposed to these related areas and receive an excellent background in basic biology and chemistry as well as in the more applied areas of biotechnology and medicine.

## **What A Degree in Microbiology & Immunology Prepares You For**

Many opportunities exist for careers in basic or The Business of Science, medical microbiology, environmental microbiology, and biotechnology. They include positions in industry (pharmaceutical and biotechnology), hospitals, universities, and government agencies (environment, public health and energy, Health Research (Technician, Research Assistant). A degree in microbiology also provides an excellent basis for entering professional and postgraduate programs in medicine, dentistry, the veterinary sciences, research, and education.

*For further information, consult the "[Career Opportunities](#)" section in this handbook.*

## **INTRODUCTION**

### **History of the Department of Microbiology and Immunology**

Sixty years ago, efforts began to consolidate teaching and research in microbiology within the faculties of Medicine and Science. As a result, a new Department of Bacteriology was founded with Dr. E.G.D. Murray as its first Chairman. Dr. Murray arrived from Cambridge to find that he was the sole staff member of a department whose few laboratories were not designed for bacteriological work. With energy and determination, Murray undertook to create a new department for teaching medical students as well as undergraduate and graduate students in the science of microbial organisms and disease pathogenesis.

Murray's work set the stage for today's extensive network of collaboration with key research institutions, including the Biotechnology Research Institute of the National Research Council, Lady Davis Institute, Institut Armand-Frappier and l'Institut de Recherches Cliniques de Montréal. The Department also has close ties with McGill's teaching hospitals: The Royal Victoria Hospital, the Montreal Children's Hospital, the Jewish General Hospital, the Montreal General Hospital, the Shriners' Hospital for Crippled Children and the Montreal Neurological Institute.

In 1965, the Department's name was changed to Microbiology and Immunology to reflect more accurately its greater scope of research and teaching activities. Additional space enlarged the Department to its present 37,000 square feet, which includes 18 laboratories and service units. Under the direction and guidance of a succession of dedicated Chairmen in the years that followed Professor Murray's exceptional 25-year tenure, the Department expanded to its present complement of professors and support staff which numbers more than 40.

### **The Department Today**

The Department of Microbiology and Immunology concentrates on four key areas of research: cellular and molecular immunology, microbial physiology and genetics, molecular biology of viruses,

and medical microbiology. There are research laboratory facilities for fourteen full-time staff members in the Duff Medical Building. Affiliated staff are in nearby research institutes or teaching hospitals.

The Department currently occupies four floors in the Duff Medical Building and includes research laboratories, major equipment rooms including flow cytometry and phosphorimager suites, media and glassware facilities, animal care facility, seminar rooms and an administrative office. The Sheldon Biotechnology Centre, located in a building contiguous to ours, provides the sophisticated services of oligonucleotide and peptide synthesis, protein and DNA sequencing, and computer-aided analysis of macromolecular structures.

## SERVICES

### Enrolment Services (Service Point)

Service Point offers a variety of administrative services for both undergraduate and graduate students.

The Service Point Office is located at 3415 McTavish Street (corner of Sherbrooke).

Contact: (514) 398-7878 OR You can visit the [website](#) for more information.

You should contact Service Point for all Student Record and Registration matters, which include:

- assistance with course and program registration for Arts and Science students
- information about exams, and approval of requests for supplemental and deferred exams for Arts or Science students
- ranking/recommendation letters for Arts and Science students
- proof of enrolment letters
- certified or translated copies of diplomas
- help with admissions
- help with Minerva
- international health insurance card and exemptions
- McGill ID cards
- official transcript pick-up
- replacement diplomas
- student study-abroad exchange programs
- help with submission of legal documents
- tuition and fees information

- US loans pick-up

## **Faculty of Science/Sousa**

The office of the Faculty of Science and the Science Office for Undergraduate Student Advising and can provide general and specific information about undergraduate science programs.

Both are located in Dawson Hall, room 405 for SOUSA services.

Contact: (514) 398-5442 or visit the [website](#) for more information.

SOUSA can be contacted for academic advising, outreach, and academic follow-up of records decisions. **SOUSA ADVISORS CAN HELP YOU WITH:**

- Freshman Program Advising
- Degree Planning,
- Degree Requirements
- University and Faculty Regulations
- Study Away/Exchange  
<https://www.mcgill.ca/science/undergraduate/handbook#exchanges>
- Readmission
- Final Exam Issues,
- Interfaculty Transfers, etc.
- SOUSA advisors cannot help you register for restricted or full courses, but they can direct you to the right person or office.

Please consult their [Handbook](#) for more information.

## **Student Services**

The Office of the Dean of Students is responsible for the coordination of all Student Services including Campus Life & Engagement, Career Planning Service (CaPS), Counselling and Mental Health, First Peoples' House, International Student Services, Office for Students with Disabilities, Office of Religious and Spiritual Life, Scholarships and Student Aid, Student Health Service, Tutorial Service. The Office is located at 3600 McTavish Street, Suite 4100. Office hours are 9:00 a.m. to 5:00 p.m., telephone 514-398-3825 or visit [student services](#) for general information.

### **Student Health & Wellness Hub**



One-stop shop for all things health and wellness: appointments with a professional, local wellness advisors, self-help resources, workshops and groups <https://mcgill.ca/wellness-hub/>

## **Hours**

The Hub is **open** from 8:30 a.m. - 4:30 p.m., Monday to Friday. **Drop-ins** begin being processed at 9 a.m. Please note that **lab hours** differ.

Brown Student Services Building  
3600 McTavish Street, 3rd floor  
Montreal, Quebec H3A 0G3  
Tel: 514-398-6017  
Fax: 514-398-2559

### **Faculty of Arts and Science Calendar**

The regulations and other important details on choosing courses are available [online](#).

### **Microbiology & Immunology Undergraduate Handbook**

The handbook which you are now reading supplements the calendar with more specific information on programs and courses in the Department. The required courses that are listed in this handbook take precedence over errors that may occur in the calendar. On line information can be found at: <http://www.mcgill.ca/microimm/undergraduate>

### **Departmental Notice Board**

The Departmental Notice Board provides current information concerning courses and programs and is located on the fifth floor of the Duff Medical Building. Important information on available scholarships and awards is posted throughout the year.

### **Code of Conduct and Mistreatment Reporting**

The Department of Microbiology & Immunology and the Faculty of Medicine are committed to build and promote a respectful and inclusive learning and work environment for teachers and learners. Please find below important links to learn how to report cases of alleged mistreatments.

[Faculty of Medicine Code of Conduct](#)  
[Wellness Enhanced Lifelong Learning \(WELL\)](#)  
[Office and the Dean of Students Office](#)

## **Student Affairs Officer**

The Office of the Student Affairs Officer is located in Room 511 of the Duff Medical Building. If you wish to enquire about or discuss any aspect of the undergraduate courses or programs offered by the Department of Microbiology & Immunology, you may contact Carmen Aimee Paez, the Student Affairs Officer by calling 514-398-3915 to make an appointment or booking as appointment only [here](#).

## **ACADEMIC ADVISORS**

<b>CHIEF ADVISOR</b>	<b>Dr. Benoit Cousineau</b>	<b>398-8929, Room 617</b> <a href="mailto:Benoit.cousineau@mcgill.ca">Benoit.cousineau@mcgill.ca</a>
<b>Study Away and Exchange Advisor</b>	<b>Dr. Benoit Cousineau</b>	<b>398-8929, Room 617 (DUFF)</b> <a href="mailto:Benoit.cousineau@mcgill.ca">Benoit.cousineau@mcgill.ca</a>
<b>Medical School Application Advisor</b>	<b>Dr. Dalius Briedis</b>	<b>398-3925, Room 510 (DUFF)</b> <a href="mailto:Dalius.briedis@mcgill.ca">Dalius.briedis@mcgill.ca</a>

## **Academic Members**

If you are looking for an individual, try checking our online list of Microimm People. This profile list will show you all academic members in the department of Microbiology & Immunology. The list can be found [here](#).

## **MICROBIOLOGY AND IMMUNOLOGY STUDENTS' ASSOCIATION (MISA)**

All students registered in Microbiology and Immunology are members of the Microbiology and Immunology Students' Association (MISA). Officers are elected yearly in the spring. MISA sponsors various events throughout the year and represents the Undergraduates at the Departmental level. The MISA office is located in Room 423 of the Duff Medical Building (e-mail: [misa@sus.mcgill.ca](mailto:misa@sus.mcgill.ca)).

## REGISTRATION

### DESIGNATION U0, U1, U1, U3:

- first year of study by four-year students (120 credits) is: U0
- second year of study is: U1
- third year of study is: U2
- fourth year of is: U3

**Quebec students who enter from CEGEP begin their studies in the U1 year and progress to U2 and U3 (90 credits).**

### Courses

A complete online list of the [courses](#) available in Microbiology & Immunology.

### Registration: General Information

Students register and make course changes via Minerva <http://www.mcgill.ca/minerva-students/>. Students also use Minerva to update their personal information, such as address and emergency contacts, and to make minor corrections (adding accents, changing upper/lower case letters) to their legal name. Students can view their grades and fee information on Minerva.

### Access to non-MIMM courses

Students who want access to register for non-MIMM courses which are full or restricted must contact the department in which the course(s) are being offered to obtain access.

Students who have taken Organic Chemistry I and 2 in Cegeps may be exempt. Please refer to [www.mcgill.ca/students/transferecredit/prospective/cegep](http://www.mcgill.ca/students/transferecredit/prospective/cegep) to find out.

Students with [course exemptions](#) from required program courses (i.e. CHEM 212, CHEM 222, MATH 203, etc.) can choose to take an elective to make up for the credits.

## Elective Courses:

Electives are courses taken for academic credit but which are not required for your degree. In this regard they differ from required or complementary courses.

Electives allow you to explore interests outside your core program, gain exposure to a wider world, and take advantage of the vast scope of opportunities at a large, comprehensive university like McGill. From astronomy to philosophy, from sociology to zoology, electives round out your education.

- Courses in Earth and Planetary Sciences would be electives for a Psychology Major because they are not required for your program.
- Music courses, for example, could be electives, depending on how they are listed on the webpage ["Restricted courses outside the Faculty of Science"](#).
- Courses not on the approved list (please refer again to ["Restricted courses outside the Faculty of Science"](#)) do not count either towards your program (major, honours, liberal) or degree requirements.
- The **number of electives that you may take** during your degree varies depending on how much room you have left after completing program requirements and prerequisites for your programs.

Please check the university calendar and carefully review course restrictions to determine whether you have permission to take a specific course. If you have any questions, please check with the [SOUASA](#), the Science Office for Undergraduate Student Advising.

## Credit Load

The normal course load is 4-5 courses (12-15 credits) per term; a full year is normally 30 credits. If you are not sure how many credits to register for each term or for the academic year, keep the following regulations in mind:

- 12 credits per term to maintain full-time status, eligibility for student visas, loans and bursaries;
- Up to 14 credits (4 courses) maximum per term for students in probationary standing;
- Up to 17 credits per term for students in satisfactory standing;
- 27 graded (non-S/U) credits per academic year (both the fall and winter terms) to be considered for renewal of entrance scholarships or for in-course McGill scholarships or awards, including Dean's Honour List; at least 27 graded credits that fulfill the degree requirements to be considered for Faculty scholarships;
- 30 graded credits per year to maintain Canadian scholarships;
- Maximum allowed credits is up to 17 credits per term for students whose standing is Satisfactory or Interim Satisfactory.
- Students whose CGPA is 3.5 or higher and who wish to take a course overload of up to a maximum of 19 credits are required to fill out a request form at Service Point, and are strongly urged to consult their adviser. Allow several working days for the processing of your request.

## Visual Schedule Builder (VSB)

Visual Schedule Builder (VSB) is a web-based application to help students build potential class schedule options prior to and during registration periods. You may access it here: <https://vsb.mcgill.ca/vsb/criteria.jsp?welcome=1> or access it on myMcGill.

Enter your courses into VSB. State your preferences (mornings or evenings off, for example) and watch as multiple conflict-free schedules are generated.

Then copy and paste CRNs (Course Reference Numbers) into the Minerva Quick Add boxes on the Registration menu so you can make your what-if schedule a reality. Or continue to browse to find more possibilities using helpful VSB features to further expand your scheduling options.

## Course Change Period ADD/DROP

You may make changes to your course registrations (add or drop courses), subject to the requirements and restrictions of your program and individual courses from the opening date of registration until the end of the Course Change period. The Course Change deadline coincides with the deadline for late registration. See [www.mcgill.ca/importantdates](http://www.mcgill.ca/importantdates).

Any courses dropped during this period will be deleted from your record and will not appear on your transcript. Your record will only show the courses in which you are registered for once the add/drop period is over.

### **Withdrawing from courses**

After the Course Change deadline in the Fall and Winter terms, there is a period of a few days during which you may withdraw with a grade of "[W](#)" and a full refund of course fees. After the Withdrawal (with refund) deadline, there is a period during which withdrawal from a course will also result in a grade of "W" but no course fees will be refunded.

After the final withdrawal (without refund) deadline, students in **exceptional circumstances** may receive permission to withdraw from a course with no impact on their GPA. For more information, students in Arts and Science should refer to [Service Point](#) while students in other faculties should still refer to their faculty students' affairs office.

Click [here](#) for the deadlines.

If you obtain permission to withdraw from courses after the withdrawal (without refund) deadline, you must submit a course withdrawal form, available from your faculty's student affairs office. Additional restrictions apply to Music students, who should [contact](#) an advisor for guidance. The date on which you withdrew is entered on Minerva and is the official date of withdrawal, even if you had stopped attending lectures earlier.

### **S/U Option - Satisfactory/Unsatisfactory**

The Satisfactory/Unsatisfactory (S/U) option is an alternative course-specific grading scheme that lets undergraduate students take courses outside their areas of specialization without fear of decreasing their GPAs. Courses with final grades of "S" or "U" are not included in GPA calculations and do not count towards your major or minor requirements.

Most eligible students can designate one **elective** course to be graded under the S/U option each term, and can use the S/U grading option for up to **10 per cent** of their total degree credits completed at McGill. Refer to the "*Courses Taken under the Satisfactory/Unsatisfactory (S/U) Option*" section of the [eCalendar](#) for more conditions and restrictions.

The S/U option is open to most students, with some **exceptions**:

- U0 (Freshman year) students in the faculties of Agricultural and Environmental Science, Arts, B.A. & Sc., and Science

- Students in the faculties of Dentistry and Medicine, or the School of Physical and Occupational Therapy.
- Graduate students
- Continuing Studies students
- Non-degree students (eg. Special students)

The full regulations on students who are eligible to use the S/U grading option can be found in the [eCalendar](#).

To choose the S/U option for an elective course, navigate to the Quick Add or Drop Course Sections Menu in Minerva. In the "course grade mode" drop down menu associated with the elective course you have chosen, select the Satisfactory/Unsatisfactory grade mode & submit to save the change. **Please note: You can only add or remove the S/U grading option until the end of the course change period (Add/Drop deadline). No changes to the grading mode can be made after this deadline.**

Be careful! If you accidentally select the S/U option for a required course, you may be required to complete a substitute course approved by your advisor to fulfill your program requirements. You should verify with your Faculty if in any doubt about your course choice.

**Note:** Visiting, Exchange, and Quebec Inter-University Transfer Agreement (IUT) students cannot select the S/U option using Minerva; please refer to the [eCalendar](#) for instructions.

### **Passing Grade (Required courses or complementary courses)**

All required and complementary courses listed in the Minor, Major and Honours programs in Microbiology and Immunology course must be passed with a grade of "C" or better.

**"D"** is a failure for required and complementary courses in your program.

If you fail a required course, it must be repeated, but only once. If that course is failed a second time, you may appeal to the Director of Advising Services (SOUSA) for permission to take the course a third time. If the permission is denied, you must withdraw from the program.

In the case of complementary courses, if you receive a grade of "D", this may be considered as one of your electives and then you can choose another complementary from the list

**Important dates:** <http://www.mcgill.ca/importantdates/>

## Examinations

### Final examinations

Formal final examinations are held during an examination period following the term in which the course is given (fall and winter terms only). The dates of the examination periods are listed in the [Important Dates](#). **Students are warned not to make travel arrangements to leave Montreal prior to the scheduled end of any examination period.** In some courses there is no final examination; standing in these courses is determined on the basis of term work and class tests. Information regarding [exam conflicts](#).

### **Missed Mid-Term examinations**

The Department of Microbiology and Immunology is taking steps to assist students who need to miss a midterm examination due to medical or analogous reasons in order to limit the need to approach multiple professors for accommodations. **Students must complete the Missed Midterm Exam Form at <https://www.mcgill.ca/microimm/undergraduate-programs/request-missing-mid-term-exam> within 1 week of the scheduled midterm, or else they will receive a grade of zero for the midterm.** We will evaluate any non-medical situations and reserve the right to make final decisions regarding what accommodations are reasonable and appropriate in the circumstances. Please consult the Student Wellness Hub for sources of support (<https://www.mcgill.ca/wellness-hub/>)



## MICROBIOLOGY & IMMUNOLOGY PROGRAMS

### LIBERAL PROGRAM (50 REQUIRED CREDITS)

This flexible 50-credit program provides students with a strong concentration in Microbiology and Immunology. Students can pursue a minor in another specialty.

A grade of C or better must be obtained in all required courses. A student who has a CGPA of 3.2 or higher can apply for admission to the graduate program in the Department of Microbiology and Immunology. However, we recommend that students who intend to proceed to [Graduate Studies](#) select the [Major](#) or [Honours](#) program. **Students are required to do at least one minor or minor concentration in another discipline.**

#### U1 Required Courses (19 credits)

\* Students who have taken CHEM 212 in CEGEP are exempt and must replace these credits with an elective course(s).

BIOL 200	<a href="#">Molecular Biology</a>	3 Credits
BIOL 202	<a href="#">Basic Genetics</a>	3 Credits
CHEM 212	<a href="#">Intro Organic Chemistry 1</a>	4 Credits*
MIMM 211	<a href="#">Introductory Microbiology</a>	3 Credits
MIMM 212	<a href="#">Laboratory in Microbiology</a>	3 Credits
MIMM 214	<a href="#">Intro Immun: Elem of Immunity</a>	3 Credits

#### U1 Complementary Course (3 credits)

3 credits select one from:

BIOC 212	<a href="#">Molec Mechanisms of Cell Funct</a>	3 Credits
BIOL 201	<a href="#">Cell Biology &amp; Metabolism</a>	3 Credits

#### U1, U2, or U3 Required Course (3 credits)

3 credits select one from:

BIOL 373	<a href="#">Biometry</a>	3 Credits
MATH 203	<a href="#">Principles of Statistics 1</a>	3 Credits
PSYC 204	<a href="#">Intro to Psychological Stats</a>	3 Credits

## **U2 Required Courses (16 credits)**

MIMM 301	<a href="#">Scientific Communication &amp; Skills</a>	1 Credit
MIMM 314	<a href="#">Intermediate Immunology</a>	3 Credits
MIMM 323	<a href="#">Microbial Physiology</a>	3 Credits
MIMM 324	<a href="#">Fundamental Virology</a>	3 Credits
MIMM 384	<a href="#">Molecular Microbiology Lab</a>	3 Credits
MIMM 385	<a href="#">Laboratory in Immunology</a>	3 Credits

## **U3 Complementary Courses (6 credits)**

6 credits selected from:

MIMM 387	<a href="#">The Business of Science</a>	3 Credits
MIMM 413	<a href="#">Parasitology</a>	3 Credits
MIMM 414	<a href="#">Advanced Immunology</a>	3 Credits
MIMM 465	<a href="#">Bacterial Pathogenesis</a>	3 Credits
MIMM 466	<a href="#">Viral Pathogenesis</a>	3 Credits
MIMM 509	<a href="#">Inflammatory Processes</a>	3 Credits

## **U1, U2 or U3 Complementary Courses (3 credits)**

3 credits selected from:

\* Students who have taken CHEM 212 or CHEM 222 in CEGEP must replace it with another complementary course.

ANAT 261	<a href="#">Intro to Dynamic Histology</a>	4 Credits
ANAT 262	<a href="#">Intro Molecular &amp; Cell Biol</a>	3 Credits
ANAT 365	<a href="#">Cellular Trafficking</a>	3 Credits
ANAT 458	<a href="#">Membranes &amp; Cellular Signaling</a>	3 Credits
BIOC 311	<a href="#">Metabolic Biochemistry</a>	3 Credits
BIOC 312	<a href="#">Biochemistry of Macromolecules</a>	3 Credits
BIOC 450	<a href="#">Protein Structure and Function</a>	3 Credits
BIOC 454	<a href="#">Nucleic Acids</a>	3 Credits
BIOC 458	<a href="#">Membranes &amp; Cellular Signaling</a>	3 Credits
BIOL 300	<a href="#">Molecular Biology of the Gene</a>	3 Credits
BIOL 309	<a href="#">Mathematical Models in Biology</a>	3 Credits
BIOL 314	<a href="#">Molecular Biology of Oncogenes</a>	3 Credits
BIOT 505	<a href="#">Sel Topics in Biotechnology</a>	3 Credits
CHEM 203	<a href="#">Survey of Physical Chemistry</a>	3 Credits
CHEM 204	<a href="#">Physical Chem./Biol.Sci. 1</a>	3 Credits

CHEM 222	<a href="#">Intro Organic Chemistry 2</a>	4 Credits*
CHEM 302	<a href="#">Intro Organic Chemistry 3</a>	3 Credits
COMP 204	<a href="#">Computer Programming for Life Sci</a>	3 Credits
COMP 206	<a href="#">Intro to Software Systems</a>	3 Credits
COMP 250	<a href="#">Intro to Computer Science</a>	3 Credits
EXMD 504	<a href="#">Biology of Cancer</a>	3 Credits
MIMM 387	<a href="#">The Business of Science</a>	3 Credits
MIMM 413	<a href="#">Parasitology</a>	3 Credits
MIMM 414	<a href="#">Advanced Immunology</a>	3 Credits
MIMM 465	<a href="#">Bacterial Pathogenesis</a>	3 Credits
MIMM 466	<a href="#">Viral Pathogenesis</a>	3 Credits
MIMM 496 (D1)	<a href="#">Micro Adv. Research Project</a>	3 Credits
MIMM 496 (D2)	<a href="#">Micro Adv. Research Project</a>	3 Credits
MIMM 497 (D1)	<a href="#">Immunology Adv. Research Project</a>	3 Credits
MIMM 497 (D2)	<a href="#">Immunology Adv. Research Project</a>	3 Credits
MIMM 509	<a href="#">Inflammatory Processes</a>	3 Credits
PATH 300	<a href="#">Human Disease</a>	3 Credits
PHAR 300	<a href="#">Drug Action</a>	3 Credits
PHAR 301	<a href="#">Drugs and Disease</a>	3 Credits
PHGY 209	<a href="#">Mammalian Physiology 1</a>	3 Credits
PHGY 210	<a href="#">Mammalian Physiology 2</a>	3 Credits

If you have passed a CEGEP course that is equivalent to a McGill course, you are exempt from that McGill course and will not receive McGill credit if you take it. Some CEGEP courses provide McGill exemptions no matter what CEGEP you were attending when you took them, while other courses provide exemptions only if taken at certain CEGEPs. To make sure you receive all the exemptions you qualify for, please visit the McGill website for [Transfer Credits & Advanced Standing](#).

### **MAJOR PROGRAM (66 REQUIRED CREDITS)**

This 66-credit program is designed for students who want to acquire a substantial background in microbiology and immunology, and in related disciplines (chemistry, biology, biochemistry). This will prepare them for professional schools, graduate education, or for entry in industry or in research institutes.

A grade of C or better must be obtained in all required courses. A student who has a CGPA of 3.2 or higher can apply for admission to the graduate program in the Department of Microbiology and Immunology.

### **U1 Required Courses (26 credits)**

\* Students who have taken CHEM 212 in CEGEP are exempt and must replace these credits with an elective course(s).

\*\* Students who have taken CHEM 222 in CEGEP are exempt and must replace these credits with an elective course(s).

BIOL 200	<a href="#">Molecular Biology</a>	3 Credits
BIOL 202	<a href="#">Basic Genetics</a>	3 Credits
CHEM 212	<a href="#">Intro Organic Chemistry 1</a>	4 Credits*
CHEM 222	<a href="#">Intro Organic Chemistry 2</a>	4 Credits**
MIMM 211	<a href="#">Introductory Microbiology</a>	3 Credits
MIMM 212	<a href="#">Laboratory in Microbiology</a>	3 Credits
MIMM 214	<a href="#">Intro Immun: Elem of Immunity</a>	3 Credits

One of:

BIOC 212	<a href="#">Molec Mechanisms of Cell Funct</a>	3 Credits
BIOL 201	<a href="#">Cell Biology &amp; Metabolism</a>	3 Credits

### **U1, U2, or U3 Required Course (3 credits)**

One of:

BIOL 373	<a href="#">Biometry</a>	3 Credits
MATH 203	<a href="#">Principles of Statistics 1</a>	3 Credits
PSYC 204	<a href="#">Intro to Psychological Stats</a>	3 Credits

### **U2 Required Courses (19 credits)**

BIOC 311	<a href="#">Metabolic Biochemistry</a>	3 Credits
MIMM 301	<a href="#">Scientific Communication &amp; Skills</a>	1 Credit
MIMM 314	<a href="#">Intermediate Immunology</a>	3 Credits
MIMM 323	<a href="#">Microbial Physiology</a>	3 Credits
MIMM 324	<a href="#">Fundamental Virology</a>	3 Credits
MIMM 384	<a href="#">Molecular Microbiology Lab</a>	3 Credits
MIMM 385	<a href="#">Laboratory in Immunology</a>	3 Credits

### **U3 Required Courses (3 credits)**

3 credits selected from:

MIMM 413      [Parasitology](#)      3 Credits

**Complementary Courses (6 credits)**

6 credits selected from:

MIMM 414      [Advanced Immunology](#)      3 Credits  
MIMM 465      [Bacterial Pathogenesis](#)      3 Credits  
MIMM 466      [Viral Pathogenesis](#)      3 Credits

**Complementary Courses (9 credits)**

9 credits selected from:

\* Students may select either ANAT 458 or BIOC 458, but not both.

ANAT 261      [Intro to Dynamic Histology](#)      4 Credits  
ANAT 262      [Intro Molecular & Cell Biol](#)      3 Credits  
ANAT 365      [Cellular Trafficking](#)      3 Credits  
ANAT 458      [Membranes & Cellular Signaling](#)      3 Credits\*  
BIOC 312      [Biochemistry of Macromolecules](#)      3 Credits  
BIOC 450      [Protein Structure and Function](#)      3 Credits  
BIOC 454      [Nucleic Acids](#)      3 Credits  
BIOC 458      [Membranes & Cellular Signaling](#)      3 Credits\*  
BIOL 300      [Molecular Biology of the Gene](#)      3 Credits  
BIOL 309      [Mathematical Models in Biology](#)      3 Credits  
BIOL 314      [Molecular Biology of Oncogenes](#)      3 Credits  
BIOT 505      [Sel Topics in Biotechnology](#)      3 Credits  
CHEM 203      [Survey of Physical Chemistry](#)      3 Credits  
CHEM 204      [Physical Chem./Biol.Sci. 1](#)      3 Credits  
CHEM 302      [Intro Organic Chemistry 3](#)      3 Credits  
COMP 204      [Computer Programming for Life Sci](#)      3 Credits  
COMP 206      [Intro to Software Systems](#)      3 Credits  
COMP 250      [Intro to Computer Sciences](#)      3 Credits  
EXMD 504      [Biology of Cancer](#)      3 Credits  
MIMM 387      [The Business of Science](#)      3 Credits  
MIMM 414      [Advanced Immunology](#)      3 Credits  
MIMM 465      [Bacterial Pathogenesis](#)      3 Credits  
MIMM 466      [Viral Pathogenesis](#)      3 Credits  
MIMM 496 (D1)      [Micro Adv. Research Project](#)      3 Credits  
MIMM 496 (D2)      [Micro Adv. Research Project](#)      3 Credits

MIMM 497 (D1)	<a href="#">Immunology Adv. Research Project</a>	3 Credits
MIMM 497 (D2)	<a href="#">Immunology Adv. Research Project</a>	3 Credits
MIMM 509	<a href="#">Inflammatory Processes</a>	3 Credits
PATH 300	<a href="#">Human Disease</a>	3 Credits
PHAR 300	<a href="#">Drug Action</a>	3 Credits
PHAR 301	<a href="#">Drugs and Disease</a>	3 Credits
PHGY 209	<a href="#">Mammalian Physiology 1</a>	3 Credits
PHGY 210	<a href="#">Mammalian Physiology 2</a>	3 Credits

\*If you have passed a CEGEP course that is equivalent to a McGill course, you are exempt from that McGill course and will not receive McGill credit if you take it. Some CEGEP courses provide McGill exemptions no matter what CEGEP you were attending when you took them, while other courses provide exemptions only if taken at certain CEGEPs. To make sure you receive all the exemptions you qualify for, please visit the McGill website for [Transfer Credits & Advanced Standing](#).

## **HONOURS PROGRAM (72 REQUIRED CREDITS)**

The Honours program in Microbiology and Immunology combines the substantial background given by the Major program with a challenging opportunity to carry out a laboratory research project in the U-3 year. The required courses that are part of the Honours program offer broad exposure to different areas important to the biomedical sciences, as well as a high degree of specialization in these disciplines. These courses prepare students for a significant research experience under the direct supervision of a professor in the Department. Those who are considering careers in research in the biological sciences or in medicine, or employment in the biotechnology field, are encouraged to take advantage of the special opportunities offered by this Honours program.

Students intending to apply to the Honours program must complete the Major program in U-1 and U-2. A CGPA of at least 3.5 must be obtained by the end of the U-2 year in order to enter the Honours in U-3.

For graduation in Honours, students must pass all required courses with a C or better and achieve a sessional GPA of at least 3.30 in the U3 year.

The Honours research project course, Independent Studies in Microbiology and Immunology (MIMM 502 D1, D2), is a unique opportunity to gain first-hand research experience, to design and execute scientific experiments using sophisticated methods and equipment, and to participate in the dynamic and creative interactions that contribute to scientific discovery. Students in the project course work in the laboratory alongside a professor, graduate students, and research assistants during two terms. They learn to communicate science in writing and by a seminar presentation. See the course description for registration requirements on the McGill website [here](#).

**Students who wish to apply to the Honours program must indicate in writing to Carmen Aimee Paez, Student Affairs Officer, by the fourth Friday of January of their U-2 year. Since there are a limited number of places available in MIMM 501/502 D1, D2 registration requires approval of the Department.**

### **U1 Required Courses (26 credits)**

\* Students who have taken CHEM 212 in CEGEP are exempt and must replace these credits with an elective course(s).

\*\* Students who have taken CHEM 222 in CEGEP are exempt and must replace these credits with an elective course(s).

BIOL 200	<a href="#">Molecular Biology</a>	3 Credits
BIOL 202	<a href="#">Basic Genetics</a>	3 Credits
CHEM 212	<a href="#">Intro Organic Chemistry 1</a>	4 Credits*
CHEM 222	<a href="#">Intro Organic Chemistry 2</a>	4 Credits**

MIMM 211	<a href="#">Introductory Microbiology</a>	3 Credits
MIMM 212	<a href="#">Laboratory in Microbiology</a>	3 Credits
MIMM 214	<a href="#">Intro Immun: Elem of Immunity</a>	3 Credits
One of:		
BIOC 212	<a href="#">Molec Mechanisms of Cell Funct</a>	3 Credits
BIOL 201	<a href="#">Cell Biology &amp; Metabolism</a>	3 Credits

**U1, U2, or U3 Required Course (3 credits)**

One of:		
BIOL 373	<a href="#">Biometry</a>	3 Credits
MATH 203	<a href="#">Principles of Statistics 1</a>	3 Credits
PSYC 204	<a href="#">Intro to Psychological Stats</a>	3 Credits

**U2 Required Courses (19 credits)**

BIOC 311	<a href="#">Metabolic Biochemistry</a>	3 Credits
MIMM 301	<a href="#">Scientific Communication &amp; Skills</a>	1 Credit
MIMM 314	<a href="#">Intermediate Immunology</a>	3 Credits
MIMM 323	<a href="#">Microbial Physiology</a>	3 Credits
MIMM 324	<a href="#">Fundamental Virology</a>	3 Credits
MIMM 384	<a href="#">Molecular Microbiology Lab</a>	3 Credits
MIMM 385	<a href="#">Laboratory in Immunology</a>	3 Credits

**U3 Required Courses (15 credits)**

MIMM 413	<a href="#">Parasitology</a>	3 Credits
MIMM 501 (D1)	<a href="#">Hons Research Proj - Immunol</a>	6 Credits*
MIMM 501 (D2)	<a href="#">Hons Research Proj - Immunol</a>	6 Credits*
MIMM 502 (D1)	<a href="#">Hons Research Proj - Microbiol</a>	6 Credits*
MIMM 502 (D2)	<a href="#">Hons Research Proj - Microbiol</a>	6 Credits*

\* Students take either MIMM 501D1 and MIMM 501D2 OR MIMM 502D1 and MIMM 502D2.

**Complementary Course (6 credits)**

6 credits selected from:

MIMM 414	<a href="#">Advanced Immunology</a>	3 Credits
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MIMM 465	<a href="#">Bacterial Pathogenesis</a>	3 Credits
MIMM 466	<a href="#">Viral Pathogenesis</a>	3 Credits

**Complementary Course (3 credits)**

3 credits selected from:

ANAT 458	<a href="#">Membranes &amp; Cellular Signaling</a>	3 Credits
BIOC 312	<a href="#">Biochemistry of Macromolecules</a>	3 Credits
BIOC 404	<a href="#">Biophysical Methods in Biochem</a>	3 Credits
BIOC 450	<a href="#">Protein Structure and Function</a>	3 Credits
BIOC 454	<a href="#">Nucleic Acids</a>	3 Credits
BIOC 458	<a href="#">Membranes &amp; Cellular Signaling</a>	3 Credits
BIOL 309	<a href="#">Mathematical Models in Biology</a>	3 Credits
BIOL 520	<a href="#">Gene Activity in Development</a>	3 Credits
BIOT 505	<a href="#">Sel Topics in Biotechnology</a>	3 Credits
CHEM 203	<a href="#">Survey of Physical Chemistry</a>	3 Credits
CHEM 204	<a href="#">Physical Chem./Biol.Sci. 1</a>	3 Credits
COMP 204	<a href="#">Computer Programming for Life Sci</a>	3 Credits
COMP 206	<a href="#">Intro to Software Systems</a>	3 Credits
COMP 250	<a href="#">Intro to Computer Sciences</a>	3 Credits
MIMM 387	<a href="#">The Business of Science</a>	3 Credits
MIMM 414	<a href="#">Advanced Immunology</a>	3 Credits
MIMM 465	<a href="#">Bacterial Pathogenesis</a>	3 Credits
MIMM 466	<a href="#">Viral Pathogenesis</a>	3 Credits
MIMM 509	<a href="#">Inflammatory Processes</a>	3 Credits
PHAR 562	<a href="#">Neuropharmacology</a>	3 Credits
PHAR 563	<a href="#">Endocrine Pharmacology</a>	3 Credits
PSYT 455	<a href="#">Neurochemistry</a>	3 Credits

## Undergraduate Program Comparison

**DEPARTMENTAL PREFIX:**

**ANAT** = Anatomy **MATH** = Mathematics

**BIOL** = Biology

**MIMM** = Microbiology & Immunology

**BIOC** = Biochemistry

**PHAR** = Pharmacology

**BIOT** = Biotechnology

**PATH** = Pathology

**CHEM** = Chemistry

**PHGY** = Physiology

**EXMD** = Exp. Medicine

**PSYC** = Psychology

	Liberal	Major	Honours
<b>U1</b>	MIMM 211 (F) (3)	MIMM 211 (F) (3)	MIMM 211 (F) (3)
	MIMM 212 (F) (3)	MIMM 212 (F) (3)	MIMM 212 (F) (3)
	MIMM 214 (W) (3)	MIMM 214 (W) (3)	MIMM 214 (W) (3)
	BIOL 200 (F) (3)	BIOL 200 (F) (3)	BIOL 200 (F) (3)
	BIOL 201(W) or BIOC 212(W) (3)	BIOL 201(W) or BIOC 212(W) (3)	BIOL 201(W) or BIOC 212(W) (3)
	BIOL 202 (W) (3)	BIOL 202 (W) (3)	BIOL 202 (W) (3)
	CHEM 212 (F or W) (4)	CHEM 212 (F or W) (4)	CHEM 212 (F or W) (4)
		CHEM 222 (F or W) (4)	CHEM 222 (F or W) (4)
	<b>22 Credits</b>	<b>26 Credits</b>	<b>26 Credits</b>
<b>U2</b>	MIMM 301 (W) (1)	MIMM 301 (W) (1)	MIMM 301 (W) (1)
	MIMM 314 (W) (3)	MIMM 314 (W) (3)	MIMM 314 (W) (3)
	MIMM 323 (F) (3)	MIMM 323 (F) (3)	MIMM 323 (F) (3)
	MIMM 324 (F) (3)	MIMM 324 (F) (3)	MIMM 324 (F) (3)
	MIMM 384 (F) (3)	MIMM 384 (F) (3)	MIMM 384 (F) (3)
	MIMM 385 (W) (3)	MIMM 385 (W) (3)	MIMM 385 (W) (3)
		BIOC 311 (F) (3)	BIOC 311 (F) (3)
	<b>16 Credits</b>	<b>19 Credits</b>	<b>19 Credits</b>
<b>U3</b>	*For complementary courses you need to obtain a total of 9 credits. 6 from MIMM plus 3 credits*	MIMM 413 (W) (3)	MIMM 413 (W) (3)
			MIMM 501 or 502 D1 (F) (6)
			MIMM 501 or 502 D2 (W) (6)
	<b>Complementary Courses:</b> Choice from blue for Major, Choice from green for Honours. + Credits for more comp. courses.	MIMM 414 (W) (3)	MIMM 414 (W) (3)
		MIMM 465 (W) (3)	MIMM 465 (W) (3)
		MIMM 466 (W) (3)	MIMM 466 (W) (3)
	<b>+9 Credits</b>	<b>+3 Credits</b>	
	<b>9 Credits</b>	<b>18 Credits</b>	<b>24 Credits</b>
<b>SUM</b>	<b>*50 Credits</b>	<b>*66 Credits</b>	<b>*72 Credits</b>

\*Total summary credits include 3 credits for BIOL 373 or MATH 203 or PSYC 204. Statistics course for all programs, to be taken in U1 or U2 or U3.12

## **INTERDEPARTMENTAL HONOURS PROGRAM (75 credits)**

IHI is a 75-credit program involving the Departments of Biochemistry, Microbiology and Immunology, and Physiology, and it incorporates elements from each of these disciplines. Since immunology is a key area of biomedical research and is critical to our understanding of the patho-physiology of many immune-mediated diseases, the program provides an excellent foundation for students interested in pursuing a career in biomedical research and/or medicine.

The program consists of 48 Required credits in basic science courses, including cell and molecular biology, microbiology and immunology, biochemistry and physiology. There are also 27 Complementary credits which allow for specialization in immunology and related disciplines. To graduate from IHI, students must have a minimum CGPA of 3.30 and must pass five immunology courses (MIMM 214, MIMM 314, MIMM 414, PHGY 419D1D2, PHGY 513, and one of BIOC 503, MIMM 509, PHGY 531) with a minimum grade of B.

### **Required Courses (48 credits)**

#### **U1 Required Courses**

20 credits selected as follows:

\* Students select either [BIOC 212](#) or [BIOL 201](#).

\*\* Students select either [PHGY 209](#) or [MIMM 211](#).

BIOC 212	<a href="#">Molecular Mechanisms of Cell Function</a>	3 credits *
BIOL 200	<a href="#">Molecular Biology</a>	3 credits
BIOL 201	<a href="#">Cell Biology and Metabolism</a>	3 credits *
CHEM 212	<a href="#">Introductory Organic Chemistry 1</a>	4 credits
CHEM 222	<a href="#">Introductory Organic Chemistry 2</a>	4 credits
MIMM 211	<a href="#">Introductory Microbiology</a>	3 credits *
MIMM 214	<a href="#">Intro Immunology: Elements of Immunity</a>	3 credits
PHGY 209	<a href="#">Mammalian Physiology 1</a>	3 credits *

#### **U2 Required Courses**

13 credits from the following:

ANAT 261	<a href="#">Introduction to Dynamic Histology</a>	4 credits
BIOC 311	<a href="#">Metabolic Biochemistry</a>	3 credits
BIOC 312	<a href="#">Biochemistry of Macromolecules</a>	3 credits
MIMM 314	<a href="#">Intermediate Immunology</a>	3 credits

### **U3 Required Courses**

15 credits from the following:

MIMM 414	<a href="#">Advanced Immunology</a>	3 credits
PHGY 419 (D1)	<a href="#">Immunology Research Project</a>	4.5 credits
PHGY 419 (D2)	<a href="#">Immunology Research Project</a>	4.5 credits
PHGY 513	<a href="#">Cellular Immunology</a>	3 credits

### **Complementary Courses (27 credits)**

#### **U1 Complementary Courses**

6 credits chosen for U1 complementary courses in the following manner.

3 credits selected from:

BIOL 373	<a href="#">Biometry</a>	3 credits
MATH 203	<a href="#">Principles of Statistics 1</a>	3 credits
PSYC 204	<a href="#">Introduction to Psychological Statistics</a>	3 credits

plus 3 credits selected from the following:

\* Students take either [PHYG 209](#) or [MIMM 211](#).

\*\* Students take either [CHEM 203](#) or [CHEM 204](#).

ANAT 214	<a href="#">Systemic Human Anatomy</a>	3 credits
ANAT 262	<a href="#">Introductory Molecular and Cell Biology</a>	3 credits
BIOL 202	<a href="#">Basic Genetics</a>	3 credits
BIOL 205	<a href="#">Biology of Organisms</a>	3 credits
BIOL 304	<a href="#">Evolution</a>	3 credits
CHEM 203 or	<a href="#">Survey of Physical Chemistry</a>	3 credits **
CHEM 204	<a href="#">Physical Chemistry/Biological Sciences 1</a>	3 credits **
COMP 202	<a href="#">Foundations of Programming</a>	3 credits
COMP 250	<a href="#">Intro to Computer Science</a>	3 credits
CHEM 287	<a href="#">Intro Analytical Chemistry</a>	2 credits
CHEM 297	<a href="#">Intro Analytical Chem. Lab. 1</a>	1 credit
MIMM 211	<a href="#">Introductory Microbiology</a>	3 credits *
MIMM 212	<a href="#">Laboratory in Microbiology</a>	3 credits
PHGY 209	<a href="#">Mammalian Physiology 1</a>	3 credits *
PHGY 210	<a href="#">Mammalian Physiology 2</a>	3 credits

## **U2 Complementary Courses**

12 credits chosen as follows:

6 credits selected from:

Students may take\* BIOC 220 and BIOC 320 or \*\* PHGY 212 and PHGY 213 and BIOL 301 or \*\*\*MIMM 384 and MIMM 385

BIOC 220	<a href="#">Lab Meth in Biochem &amp; Molecular Biol 1</a>	3 credits *
BIOC 320	<a href="#">Lab Meth in Biochem &amp; Molecular Biol 2</a>	3 credits *
MIMM 384	<a href="#">Molecular Microbiology Laboratory</a>	3 credits ***
MIMM 385	<a href="#">Laboratory in Immunology</a>	3 credits ***
PHGY 212	<a href="#">Introductory Physiology Laboratory 1</a>	1 credit **
PHGY 213	<a href="#">Introductory Physiology Laboratory 2</a>	1 credit **
BIOL 301	<a href="#">Cell and Molecular Laboratory</a>	4 credits **

plus 6 credits, selected from:

\* Students take either [BIOL 309](#) or [MATH 315](#), but not both.

ANAT 365	<a href="#">Cellular Trafficking</a>	3 credits
BIOL 300	<a href="#">Molecular Biology of the Gene</a>	3 credits
BIOL 309	<a href="#">Mathematical Models in Biology</a>	3 credits *
BIOL 314	<a href="#">Molecular Biology of Oncogenes</a>	3 credits
CHEM 302	<a href="#">Introductory Organic Chemistry 3</a>	3 credits
MATH 222	<a href="#">Calculus 3</a>	3 credits
MATH 315	<a href="#">Ordinary Differential Equations</a>	3 credits *
MIMM 323	<a href="#">Microbial Physiology</a>	3 credits
MIMM 324	<a href="#">Fundamental Virology</a>	3 credits
PATH 300	<a href="#">Human Disease</a>	3 credits
PHAR 300	<a href="#">Drug Action</a>	3 credits
PHAR 301	<a href="#">Drugs and Disease</a>	3 credits
PHAR 303	<a href="#">Principles of Toxicology</a>	3 credits
PHGY 311	<a href="#">Channels, Synapses &amp; Hormones</a>	3 credits
PHGY 312	<a href="#">Resp, Renal, &amp; Cardiovascular Physio</a>	3 credits
PHGY 313	<a href="#">Blood, Gastro, &amp; Immune Sys Physio</a>	3 credits
PHGY 314	<a href="#">Integrative Neuroscience</a>	3 credits

## **U3 Complementary Courses**

9 credits of U3 complementary courses chosen in the following manner:

3 credits selected from:

BIOC 503	<a href="#">Immunochemistry</a>	3 credits
MIMM 509	<a href="#">Inflammatory Processes</a>	3 credits
PHGY 531	<a href="#">Topics in Applied Immunology</a>	3 credits

plus 6 credits selected from:

\* Students take either [ANAT 458](#) or [BIOC 458](#), but not both.

ANAT 458	<a href="#">Membranes and Cellular Signaling</a>	3 credits *
BIOC 404	<a href="#">Biophysical Methods in Biochemistry</a>	3 credits
BIOC 450	<a href="#">Protein Structure and Function</a>	3 credits
BIOC 454	<a href="#">Nucleic Acids</a>	3 credits
BIOC 458	<a href="#">Membranes and Cellular Signaling</a>	3 credits *
BIOC 503	<a href="#">Immunochemistry</a>	3 credits
BIOL 520	<a href="#">Gene Activity in Development</a>	3 credits
MIMM 413	<a href="#">Parasitology</a>	3 credits
MIMM 465	<a href="#">Bacterial Pathogenesis</a>	3 credits
MIMM 466	<a href="#">Viral Pathogenesis</a>	3 credits
MIMM 509	<a href="#">Inflammatory Processes</a>	3 credits
PHAR 503	<a href="#">Drug Discovery and Development 1</a>	3 credits
PHAR 504	<a href="#">Drug Discovery and Development 2</a>	3 credits
PHGY 531	<a href="#">Topics in Applied Immunology</a>	3 credits
PHGY 552	<a href="#">Cellular and Molecular Physiology</a>	3 credits

## **MINOR PROGRAMS**

A minor is an area of secondary concentration. You may use your elective courses to pursue an 18 to 24 credit minor in a subject area different from your major. You can pursue your minor within the Faculty of Science, or many other faculties, including Arts. (In Arts, a minor is known as a "minor concentration.")

A minor allows you to explore a second area of interest, without requiring as many courses as a major program. Many minors are interdisciplinary, such as Geochemistry, Cognitive Science, or Natural History.

Please see our [programs of study](#) webpage for a list of all the minors (and majors!) open to Science students.

## Applying to Graduate

Make sure you have completed these steps and satisfied these requirements. See your SOUSA advisor if you have questions or have trouble making a change on Minerva.

1. **Apply to graduate on Minerva** in your final year. Deadlines vary, and can be a few months before graduation. Do this when you are pretty sure when you will graduate. Note that applying for graduation does not affect your ability to change your courses or your programs, and you do not have to wait for your final grades to show on your transcript, even if you have deferred an exam from a previous term.

Select the correct term of graduation:

**Winter = May graduation, June convocation**

**Summer = October graduation, November convocation**

**Fall = February graduation, June convocation**

This should show near the top of your Minerva transcript, on the right.

If you cannot select the term you want on Minerva, contact your SOUSA advisor. Do NOT select any other term that is "close"!

See the [Convocation and Diploma](#) site for instructions on attending convocation and getting your diploma.

2. **120 credits minimum** total required for Bachelor degree. Shows at bottom of transcript under "Total Credits".
3. **Freshman requirements met** (non-CEGEP students), even if you were admitted into U1. If you received 24 or more advanced standing credits and were accepted into U1, you are still responsible for ensuring that your freshman sciences are complete.
4. **Correct program(s) on transcript in final term.**  
Verify your Minerva transcript. You cannot graduate with an incomplete program on your record in your final term. If you do not intend to complete a program, drop it. Also, you will not graduate from a program if it is not listed in your final term. (Management minors can be an exception, we sometimes add those late).  
If you think you are in an Honours program, it should say so on your transcript. If it does not, see your *program* advisor.
5. **All programs completed.** Check with your [program advisor\(s\)](#).  
Please check this early enough to make course changes if needed.
6. **Max 18 credits outside Arts and Science** allowed. [Some programs can exceed this limit.](#)



7. **No restricted courses outside Arts and Science!** Check our [list of restricted courses](#). If you take a course outside Arts or Science and it is on the Approved list, that is ok. If it is on the Not Approved list (or not listed at all), you may not get credit. See your SOUSA advisor.
8. **All transfer credits** from study away or exchange show on your transcript. This is why students cannot graduate in the same term they have an exchange or study away. The credits will not arrive in time.
9. **S/U option** – max allowed is 10% of your McGill credits. Only for electives! If you did an exchange year and only did 90 credits at McGill, then you can only have a max of 9 credits with the S/U option. Cannot be used for program or freshman courses.
10. **Repeated courses only get credit once** if passed more than once. Watch your credit total, especially if you are repeating a course where you already earned a D grade! If you are repeating a topics or research project course, be sure to contact your SOUSA advisor to verify that you will get credit twice. Otherwise you may not!

How can you tell if you are getting credit? Once the grade is on your transcript, you will see [A] [I] or [E] beside it.

[A] - included in CGPA but excluded from credit count

[I] - included in CGPA and included in credit count

[E] - excluded from both CGPA and credit count

11. **CGPA 2.00 minimum** required (3.00 for honours, but some programs are higher) If you are in an honours program and cannot meet the 3.0 (or higher, depending on the department) requirement, talk to your program advisor about your options.
12. **Pay all your fees**, including library fines. While this will not prevent graduation, if you have a fee hold on your Minerva transcript (just below your name and ID info), you may not be able to get your diploma or order official transcripts until the hold is cleared. If you have questions about your fees, see Service Point.

## CAREER AND EMPLOYMENT OPPORTUNITIES

### Career and Placement Services

McGill University offers Career and Placement Services for its students. This service provides information regarding summer employment, preparing a curriculum vitae, contacting various governmental agencies, and employment opportunities in chosen fields. Counsellors are available to answer questions at the office, which is located in the Brown Student Services Building, Suite: 2200, 3600 McTavish St., Montreal, H3A 1Y2, telephone no.: 398-3304.

### Future Opportunities

A degree in microbiology provides an excellent basis for entering professional and postgraduate programs in biomedical research, education, medicine, dentistry, and the veterinary sciences. Many opportunities exist for careers in pure or The Business of Science, medical microbiology, environmental microbiology, and biotechnology. They include positions in industry (pharmaceutical, agri-food, service and biotechnology), hospitals, universities, research institutes, and government (environment, public health and energy).

**The following is a list of the major categories of employers in Microbiology and Immunology.**

<u>CATEGORY (EXAMPLE)</u>	<u>PROJECT AREAS</u>
BIOLOGICAL INDUSTRIES (Cedarlane)	Monoclonals, Biological Products
ENERGY INDUSTRIES (Petrocan)	Waste Management, Petro-chemicals
ENVIRONMENT LABORATORIES (Department of Environment)	Environmental Analysis and Monitoring
FERMENTATION INDUSTRIES (Labatt, Seagram, Agropur)	Production and Quality Control
FOOD INDUSTRIES (Maple Leaf)	Quality Control, Meat, Bakeries, etc.
HEALTH AND WELFARE	Drug, Food Additives Evaluation

(Government of Canada)	
HOSPITALS (Royal Victoria Hospital)	Diagnostic, Research
LABORATORIES (Bioresearch)	Product Testing
MEDICAL LABORATORIES (Provincial Health Labs)	Vaccination, Pathogen Analysis
MEDICAL & SCIENCE SUPPLY COMPANIES (Fisher Scientific)	Marketing, Product Support
MUNICIPAL LABORATORIES (Sewage Management)	Waste Management
PHARMACEUTICAL COMPANIES (Merck Frosst Canada Inc.)	Research, Marketing
PULP AND PAPER INDUSTRIES (Paprican)	Waste Management, Fermentation
UNIVERSITIES (McGill University)	Teaching, Research
WATER RESOURCES (Provincial Water Resources)	Water Contamination Analysis

**The following are partial lists of mostly Quebec-based employers, divided by category, who offer employment opportunities in the biomedical, biotechnological and microbiological fields.**

### **HUMAN AND VETERINARY HEALTH CARE**

#### **NAME**

#### **PROJECT AREAS**

BIO-MÉGA INC.  
Laval

Pharmaceutical test kits

BIO-RESEARCH LABORATORIES LTD.  
Senneville

Various

BRISTOL MYERS SQUIBB CANADA  
Saint-Laurent

Pharmaceuticals

ROCHE DIAGNOSTIC INC. (FRAPPIER)  
201 Boul Armand-Frappier, Laval

Diagnostic kits, cell cultures

BIOCHEM IMMUNOSYSTEMS INC.  
10900 Rue Hamon, Montreal

Chemical products, veterinary and  
diagnostic products

JOHNSON & JOHNSON INC. Mtl.

Absorption products

### **AGRI-FOOD**

#### **NAME**

#### **PROJECT AREAS**

ACTOL CHEMICALS LTD.  
Delson

Starch modification, polymers  
and polyvinyls

AGROPUR AGRI-FOOD COOPERATIVE  
Granby

Cheese, yogurt, butter, milk, ice cream  
fruit drinks

A. LASSONDE INC.  
Rougemont

Fruit juices, vegetable juices, fruit drinks

CENTRE D'INSÉMINATION ARTIFICIELLE  
DU QUÉBEC (C.I.A.Q.) INC.  
Sainte-Hyacinthe

Frozen semence of bull and animal  
embryo

CHAMPLAIN INDUSTRIES LTD.  
Stanbridge Station

Food additives, protein, skimmed and  
concentrated milk, beer yeast

FROMAGES SAPUTO LTD.  
Montreal

Cheese

JOSEPH E. SEAGRAM & SON LTD.  
1430 Peel, Montreal

Ethylic alcohol, alcoholic beverages

LABATT BREWING COMPANY LTD. Mtl.  
LABRADOR LAURENTIENNE INC.

Beer, draught, beer yeast  
Natural Spring Resources

LACTANCIA LTD. Victoriaville

Milk powder, butter, cheese

LANTIC SUGAR LTD. Mtl.	Sugar
LIBERTY BRAND PRODUCT INC. Brossard	Cheese, yogurt, butter, cream
MOLSON BREWERIES OF CANADA LTD. Montreal	Beer, draught, beer yeast
OGILVIE MILLS LTD. Montreal	Food additives and preservatives, glucides, vegetal proteins
La COOP PURDEL Le Bic	Dairy products and derivatives, bakery marine products, animal food
ROLMEX INC. Boucherville	Lactic cultures
ROSELL INSTITUTE INC. Mtl.	Freeze-dried lactic cultures
DISTILLERIES SCHENLEY (les) Valleyfield	Alcoholic beverages
SEMICO INC. Sainte-Rosalie	Seeds
<b><u>FORESTRY AND PULP &amp; PAPER</u></b>	
<b><u>NAME</u></b>	<b><u>PROJECT AREAS</u></b>
ABITIBI BOWATER Mtl.	Pulp and paper
DOMTAR INC. Montreal	Pulp and paper, forestry products, fine chemical products
IOGEN INC. Mtl.	Forestry biomass valorization, enzyme
NORANDA INC. TECHNOLOGY CENTRE Pointe-Claire	Metal and forestry products
PREMIER ENTERPRISES CDN LTD. Rivière-du-Loup	Peat moss, biofilter, compost, peat-based culture media

PULP AND PAPER RESEARCH INSTITUTE  
OF CANADA (PAPRICAN) Pointe-Claire

Pulp and paper, effluent treatment

JARDIN DION INC.

In vitro culture of ornamental plants,  
vegetables Boisbriand and trees

**ENVIRONMENT**

**NAME**

AIR LIQUID CANADA LTD.  
Montreal

**PROJECT AREAS**

Assisted oil recovery, pulp and paper,  
waste water treatment

DEGRÉMONT INFILCO LTD. Mtl.

Water treatment equipment

VEOLIA INC. Mtl.

Effluent treatment

SANIVAN INC.  
Montreal

Environmental protection, treatment of  
toxic industrial wastes

**CONSULTING AND ENGINEERING SERVICES**

**NAME**

MONENCO LTD. Mtl.

Process engineering

RECBIOMINE INC. Mtl.

Metal biolixiviation

ROCHE LTD. Sainte-Foy

Environmental engineering

SNC LAVALIN GROUP Mtl.

Process and environmental engineering

**MAJOR CANADIAN BIOTECHNOLOGY EMPLOYERS**

**NAME**

ALLELIX INC. Mississauga, Toronto, Ontario

Diagnostic, Growth Factors

ONCOTHYREON INC.  
University of Alberta  
Edmonton, Alberta

Immunodiagnosics  
Immunotherapeutics

**BIOMEDICAL COMPANIES IN THE MONTREAL AREA**

ABBOTT LABS LTD.  
AMERSHAM PHARMACIA CANADA  
ALGENE BIOTECHNOLOGIES  
APOTEX INC.  
ASTRA PHARMA CANADA  
BAYER CANADA  
BECKMAN INSTRUMENTS CANADA  
BIOCHEM PHARMA  
BIOMATRIX  
BIOMERIEUX CANADA INC.  
BIORECHERCHE CANADA  
BIORTHEX  
BIOVET  
BOEHRINGER MANNHEIM CANADA  
BRISTOL-MEYERS SQUIBB  
MEDTRONIC CRYOCATH  
LPTECHNOLOGIES INC.  
ELI LILLY CANADA  
FISHER SCIENTIFIC  
FORMULEX CANADA INC.  
GELMAN SCIENCES INC.  
GENEKA BIOTECHNOLOGIES INC.  
HAEMACURE CORP.  
HOECUST MARION ROUSSEL CANADA Laval  
HOFFMANN LAROCHE LTD.  
ICN CANADA  
INSTITUT ARMAND-FRAPPIER Laval  
LABOPHARM INC.  
LABORATOIRE MICROBIOCHEM INC.  
LABORATOIRES BIOPHARM INC.  
MALLINKRODT CANADA  
MANDEL SCIENTIFIC  
MERCK FROSST CANADA INC.  
METHYLGENE INC.  
NOVARTIS PHARMACEUTICALS CANADA  
NOVOPHARM QUEBEC

NYMOX  
PERKIN ELMER CANADA  
PFIZER  
PHOENIX INTERNATIONAL  
POLYMER SOURCE INC  
QUANTUM BIOTECHNOLOGIES INC.  
RHONE-POULENC-RORER  
ROUGIER INC.  
RTP PHARMA INC.  
SABEX INC.  
SARSTEDT W CANADA  
SCHERING CANADA INC.  
SODEXEN INC.  
SPINEX MEDICAL TECHNOLOGIES INC.  
THERALIPIDS INC.  
THERAPEX  
UPJOHN CANADA  
VWR CANADA  
WELLCOME INC.  
WYETH AYERST LTD.

#### **GOVERNMENT RESEARCH CENTRES**

**BIOTECHNOLOGY RESEARCH INSTITUTE (NRC - BRI)** Montreal  
**AGRICULTURE CANADA**  
**SAINT-HYACINTHE FOOD RESEARCH CENTRE** Saint-Hyacinthe  
**LAURENTIAN FORESTRY CENTRE** Sainte-Foy  
**ANIMAL PATHOLOGY LABORATORY** Montreal  
**LENNOXVILLE RESEARCH STATION** Lennoxville  
**SAINT-JEAN-SUR -RICHELIEU RESEARCH STATION** Saint-Jean-sur-Richelieu  
**SAINTE-FOY RESEARCH STATION** Sainte-Foy  
**CENTRE QUÉBÉCOIS DE VALORISATION DE LA BIOMASSE** Sainte-Foy  
**INSTITUT DE TECHNOLOGIE AGRO-ALIMENTAIRE** Saint-Hyacinthe (LaPocatière)  
**CENTRE DE RECHERCHE INDUSTRIELLE DU QUÉBEC** Sainte-Foy  
**MONTREAL BOTANICAL GARDEN** Montreal

#### **QUÉBEC UNIVERSITIES**

**MCGILL UNIVERSITY**  
Montreal

- Sheldon Biotechnology Centre
- Office of Industrial Research
- Macdonald College, Ste-Anne-de-Bellevue



**UNIVERSITÉ DE QUÉBEC**

Abitibi-Témiscamingue

Chicoutimi

Hull

Montréal

- Armand-Frappier Institute, Laval
- Institut National de la Recherche Scientifique (INRS)

Rimouski

Trois-Rivières

**UNIVERSITÉ DE MONTRÉAL**

Montréal

- Clinical Research Institute of Montréal (IRCM)
- Montréal Cancer Institute
- Ecole Polytechnique de Montréal/Technology Development Centre
- Veterinary School of Medicine, Saint-Hyacinthe

**UNIVERSITY OF SHERBROOKE**

Sherbrooke

**LAVAL UNIVERSITY**

Sainte-Foy

- Industrial Liaison Office
- Centre Hospitalier de l'Université de Laval (CHUL)

**CONCORDIA UNIVERSITY**

Montreal

**BISHOP'S UNIVERSITY**

Lennoxville