

**Department of Microbiology & Immunology
McGill University**

MIMM 501/502 D1, D2; *Independent Studies in Microbiology and Immunology*

Honours Research Project; 12 Credits

Instructor, Course Coordinator

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Class Time and Location

Mondays in Fall and Winter semesters, 2:35 to 5:00 pm (end time may vary depending on content)
Lyman-Duff Building, 3775 University Street, Room 507/509 (unless otherwise noted)

Prerequisites

Students entering their final year of the undergraduate B.Sc. program in the Department of Microbiology & Immunology are encouraged to consider *Independent Studies in Microbiology and Immunology*, concurrently MIMM 501 (*Immunology* section) and MIMM 502 (*Molecular Microbiology* section). The course provides an intensive 12-credit program of study (6 credits Fall and 6 credits Winter) and research in the laboratory of a McGill Professor. **The number of places is limited to ~20 students.** To qualify for Fall registration in this course, students must have completed all U2 requirements, have a CGPA of 3.7 or higher at the Fall term of U2 and complete an entry exam.

Registration

An information meeting about the course MIMM 501/502 is held annually in November for students who intend to apply for registration. Students must communicate to the course coordinator their wish to register and provide documentation that supports their eligibility: up-to-date unofficial academic transcript and a letter stating areas of research interest (Immunology or Molecular Microbiology). Documents should be submitted to the MIMM Student Affairs Officer (undergrad.microimm@mcgill.ca).

Acceptance

Documentation includes a **letter of agreement** between the supervisor and the student, a **detailed half-page summary of the proposed research project**, and the signatures of both the student and the proposed supervisor (*Guidelines for Professors' Responsibilities in MIMM 501/502* provided) and a completed **entry exam**. The course coordinator must approve all such arrangements prior to

registration in Fall.

Following acceptance into the course the student is responsible for changing their program to Honours in Minerva.

Research Project

The professor who acts as supervisor will direct the research project and will provide laboratory space, materials and supplies for the project. Because this is a 12-credit course, students are expected to devote at least 40% of their academic effort towards this course and their research. The nature of the project is determined by consultation between the professor and the student.

Learning Outcomes

By the end of this course, students will be able:

- to design a hypothesis-driven research project in *Molecular Microbiology or Immunology*
- to execute well-controlled experiments that fulfill specific aims, mastering techniques and operating equipment specific to each laboratory
- to develop communication skills and to acquire speaking confidence that permit the student to explain the project's objectives to fellow students, to specialists and to non-specialists
- to communicate mid-term progress of the project by writing a proposal that is submitted for grading
- to document overall achievements of the project by writing an extended manuscript that reports and analyzes data and interprets the scientific achievements
- to deliver a 15 minute research seminar at the conclusion of the course

Course Content

The classroom and laboratory-based research course in the final undergraduate year (U3) of the MIMM Honours program builds on lecture-based content of many courses that have been completed in the two previous years. In addition, the 6-credit laboratory course (MIMM 384/5) in U2 introduced students to experimental tools and provided hands-on experiences in Molecular Microbiology and Immunology.

Given these foundations, the above Learning Objectives for the two-semester program are supported by the following activities as course content:

- Acquire scientific background about a selected project by reading and learning content of scientific publications from the laboratory of the PI and by analyzing research reports and graduate theses that relate to the topic;
- Expand understanding of the topic by accessing library-based tools for directed literature searches, leading to a thorough review of scientific background for the project;
- Design a hypothesis-driven project, complementing the long-term program of the PI;
- Propose specific aims for the project and through regular direction from the PI, organize experiments that address those aims;
- Master skills at the bench, acquiring expertise with specific equipment and learning from others (graduate students, PDFs, Research Technicians, Assistants, and Associates) in the

group who are more senior in their research training;

- Participate at weekly seminars (each ~2 hours) that are delivered by the course coordinators and guest lecturers; sessions focus on tools of research and skills to mature as a scientist; discuss the “get-along” factor (i.e. lab citizenship) in the laboratory that leads to respect and success as a trainee;
- Evolve from competition among students to collaboration among students as colleagues;
- Comprehend concepts of academic integrity relating to laboratory-based research by participation at a specialized training session;
- Learn communication tools including:
 - Effective use of PowerPoint
 - Providing constructive criticism
 - Speaking about your research in broad terms
- Hone writing skills by creating drafts of documents that are first circulated to lab members for suggestions; revise texts and submit for grading (November; with late penalty) a 5-page NSERC-style research Proposal via Peergrade, a peer-based assessment platform (supervised by the course coordinator).
- Reconstruct the Proposal after reviewing instructors’ comments, e-exchanging documents with a fellow student and then receiving peer feedback using Track Changes (TC); the final pdf version is submitted to the course coordinator and to the PI at an announced deadline;
- Discuss progress of the project at weekly or bi-weekly seminars (autumn and winter semesters) that are convened by the course coordinators and at lab meetings of the PI and team members;
- Give a 5-10 minute “Science in the News” presentation with a classmate on a scientific topic of your choice.
- Seek assistance, guidance and mentoring from the PI and from professors in MIMM, soliciting support for career plans, for applications and letters of reference to professional and academic opportunities, and for prospects at interviews;
- Compose a *30-page manuscript in the format of a designated target journal, incorporating Introduction, Materials and Methods, Results, Discussion, Acknowledgments, Literature Cited. A draft is exchanged with a classmate for peer review in a one-week turnaround; the final pdf version is submitted (April) to the course coordinator and to PI at an announced deadline (with late penalty); *final details to be discussed
- Engage in multiple practice sessions at which students organize their research project into a timed 15-minute power point presentation; receive feedback and suggestions from coordinators and fellow students;

- Present the research project at MIMM Student Research Day (end of April), organized as a scientific conference that includes a panel of professors as evaluators and moderator, and broad attendance by PIs from multiple laboratories; field questions from the audience; accept criticism in written evaluations from professors and participate in peer evaluation that determines the department's prize for best presentation.

Assignments and Evaluation

The following describes how learning will be evaluated and provides guidelines for students to structure and pace their study and to gauge their progress.

1. **15%** of the final grade will be assigned by the course coordinator for attendance and active participation in class and completing assignments.
2. **15%** of the grade will be assigned by the course coordinators to the Proposal, due mid-November. Expectations for the proposal will be delivered at one of the autumn seminars.
3. **30%** of the final grade will be assigned by the professor who directs the project. This grade will be based on an assessment of the performance of the student and will consider the student's efforts, abilities, lab citizenship and success in research. A written evaluation by the professor will be requested by the course coordinator and this evaluation will be transmitted to the student.
4. **25%** of the grade will be assigned to the final written manuscript. It must be submitted to the course coordinator approximately 2 weeks before Honours Student Research Day of the Department of Microbiology and Immunology. The report will take the form of a *Journal of Immunology* manuscript and will include Title Page, Abstract, Introduction, Materials and Methods, Results, Discussion, Literature Cited, Figures and Tables. The Instructions to Authors are those of the *Journal of Immunology* and are found at <http://www.jimmunol.org/site/misc/authorinstructions.xhtml#generalguide>. The report will be graded by a professor who is not the supervisor of the project and who is familiar with the general research area of the student's project. Written comments by the evaluator will be encouraged.
5. **15%** of the grade will be assigned to the oral presentation. All students must present their research findings at Student Research Day. This event will be scheduled at the end of April. A title for the presentation must be submitted to the course coordinator by mid-April. The research presentations will be evaluated by three professors. Based on peer evaluations, the Department makes an award to the student who delivers the best presentation at Student Research Day.
6. **Penalties for late and incomplete assignments will be applied. Maximum of 1/3 of a letter grade per day.**

McGill Policy Statements

"McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures". For more information, see www.mcgill.ca/students/srr/honest/ Approved by Senate on 29 January 2003.

"In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded." *"Conformément à la Charte des droits de l'étudiant de l'Université McGill, chaque étudiant a le droit de soumettre en français ou en anglais tout travail écrit devant être noté (sauf dans le cas des cours dont l'un des objets est la maîtrise d'une langue)."*

Approved by Senate on 21 January 2009.

McGill has policies on sustainability, paper use and other initiatives to promote a culture of sustainability at McGill." (See the Office of Sustainability.)

In keeping with McGill's preparedness planning strategies with respect to potential pandemic or other concerns, the Administration suggests that this course outline contain the statement: "In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change."

- Additional policies governing academic issues which affect students can be found in the McGill Charter of Students' Rights.