

McGILL UNIVERSITY

**DEPARTMENT OF
MICROBIOLOGY & IMMUNOLOGY**



**MIMM 384
MOLECULAR MICROBIOLOGY LAB
COURSE OUTLINE**

Fall 2026

© Dr Benoit Cousineau, Dr Greg Marczynski and Dr Jasmin Chahal

Course content and instructional approaches:

This course presents the student with a series of laboratory exercises in molecular biology. The general objective is to provide a practical and theoretical introduction to the technology used in bacteriology, microbiology and virology research. This course is designed as an inquiry-based lab course. Thus, similar to research labs, each module entails one overall question, which will be broken down into specific aims. Each aim will require students to perform various molecular biology techniques and develop critical thinking about their experimental designs and results. Students will be assessed on the learning outcomes below.

Pre-requisites: MIMM 211 - Biology of Microorganisms, MIMM 212 - Laboratory In Microbiology
Co-requisites: MIMM 323 - Microbial Physiology and Genetics, MIMM 324 - Fundamental Virology

Class time and location:

Mondays, 2:30-3:30 pm: Pre-Laboratory Lectures

Lyman Duff Medical Building, Amphitheater

Wednesdays, 1:30-5:30 pm: Laboratory exercises

Laboratory Cubicles, 4th floor of the Lyman Duff Medical Building.

Fridays, 1:30-3:30 pm: Laboratory exercise follow-up periods (as required)

Laboratory Cubicles, 4th floor of the Lyman Duff Medical Building.

Fridays, 2:30-3:30 pm: Lectures (as required)

Lyman Duff Medical Building, Amphitheater

Course coordinators:

Labs 1-6: Dr Benoit Cousineau

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Office hours: via appointment by email

Labs 7-12: Dr Greg Marczyński

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Laboratory Staff:

Dr David Gagnon

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Learning outcomes

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

1. Explain the theory behind each laboratory technique.
2. Perform laboratory techniques commonly used in research labs.
3. Design experiments with appropriate standards and controls.
4. Properly analyze data obtained in the lab.
5. Present research results in a clear and efficient manner.
6. Use a scientific approach to problem-solving.
7. Analyze, interpret, summarize and clearly present scientific information.

Course Materials

The laboratory manuals will be available on myCourses.

Please bring the following essential materials to the laboratory classes:

- Lab coat
- Safety glasses/goggles
- Sharpie
- Hardcover lab book with lined pages (available at the McGill bookstore)

Evaluations

Laboratory reports	30%
Pre-lab quizzes	5%
Lab notebook and performance-based assessment	5%
Midterm Exam (Labs 1-6)	30%
Final Exam (Labs 7-12)	30%

Laboratory Reports (30%):

Three lab reports, which include purpose, introduction, result and discussion sections will be due at 23h59 one week after the completion of the last laboratory exercise of the corresponding section. Lab reports will be worth 2% (Lab 1), 13% (Lab 2-6) and 15% (Lab 7-12) of the overall course grade. They should be submitted as PDF files and emailed directly to your TA. The rubric is provided on MyCourses.

Pre-Lab Quizzes (5%):

The 11 quizzes will consist of short-answer style questions and will be held in person at the beginning of each laboratory exercise to assess understanding of theory and laboratory methodology.

Performance-based assessment and lab notebook (5%):

Lab notebook will be evaluated at the end of the course. TAs will assess clarity and detailed notes on protocols and results. Students will also be evaluated on their performance in the lab. The rubric is provided on MyCourses.

Midterm (Labs 1-6) (30%) and Final (Labs 7-12) (30%) Exams:

Two-hour written examinations that will test theory, application and experimental design. The midterm will be held during the semester and the final exam will be held during the final exam period. These assessments will be held in person. More information regarding location, date and format will be provided during the semester.

Important notes

- 5% deduction will be applied for each day of late submission of the laboratory reports, and will receive a 0 after one week.
- It is mandatory to attend all lab sessions, arrive on time and stay until the end of the lab session. If you are unable to attend a class, you must let your TA, lab mate and the professor know.
- Starting any assessment (i.e. midterm) means it will be graded and count towards your final mark.
- Note regarding missed laboratory exercise: As the material in all the laboratory exercises will be covered on the exams, it is mandatory that you obtain the data for any missed exercise from your TA and that you still write and submit the corresponding laboratory report. This will ensure that you understand the scientific principles, technical details and logical analysis of this exercise for the exams.
- Students unable to attend the midterm exam due to medical or non-medical reasons must submit a request for missing the exam within 1 week of the scheduled mid-term. Students who fail to do so will receive a grade of zero for the midterm exam. Students must make the request by contacting the course coordinator by email (benoit.cousineau@mcgill.ca) who will evaluate any medical and non-medical situations and reserves the right to make any final decisions regarding what accommodations are reasonable and appropriate in the circumstances.
- Missed Final exam is handled by service point. Please visit <https://www.mcgill.ca/exams/> for information about deferred and supplemental exams.

COURSE CALENDAR - FALL 2026

DAY	DATE	TIME / ROOM / ACTIVITY
Mon	31 Aug.	2:30 p.m. Lyman Duff Medical Building, Amphitheater Lecture: Protein assays
Wed	2 Sept.	1:30 p.m. Laboratory cubicles Laboratory: Protein quantification: the Bradford assay
Fri	4 Sept.	2:30 p.m. Lyman Duff Medical Building, Amphitheater Lecture: Endonuclease restriction analysis
Mon	7 Sept.	Labour day – no lecture
Wed	9 Sept.	1:30 p.m. Laboratory cubicles Laboratory: Endonuclease restriction analysis of plasmid preparations Lab report #1 due at 23h59
Fri	11 Sept.	
Mon	14 Sept.	2:30 p.m. Lyman Duff Medical Building, Amphitheater Lecture: PCR analysis
Wed	16 Sept.	1:30 p.m. Laboratory cubicles Laboratory: PCR to determine gene orientation in plasmids
Fri	18 Sept.	
Mon	21 Sept.	2:30 p.m. Lyman Duff Medical Building, Amphitheater Lecture: Transformation of bacterial cells
Wed	23 Sept.	1:30 p.m. Laboratory cubicles Laboratory: Transformation of <i>E. coli</i> with a plasmid and preparation of the SDS-Polyacrylamide gel
Fri	25 Sept.	1:30 p.m. Laboratory cubicles Follow up: Count transformed <i>E. coli</i> colonies.
Fri	25 Sept.	2:30 p.m. Amphitheatre Lyman-Duff Lecture: Purification, electrophoresis and transfer of GST fusion protein
Mon	28 Sept.	2:30 p.m. Amphitheatre Lyman-Duff Lecture: Immunodetection of GST fusion protein
Wed	30 Sept.	1:30 p.m. Laboratory cubicles Laboratory: Purification of the GST fusion protein
Fri	2 Oct.	1:30 p.m. Laboratory cubicles Follow up: Run the SDS-Polyacrylamide gel electrophoresis and protein transfer from the gel to a membrane
Mon	5 Oct.	Québec Élection Day – no lecture
Wed	7 Oct.	1:30 p.m. Laboratory cubicles Laboratory: Immunodetection of GST fusion protein
Fri	9 Oct.	Fall Break – no lab follow up
Mon	12 Oct.	Thanksgiving – no lecture
Wed	14 Oct.	Fall Break – no lab session

Fri	16 Oct.	Lab report #2 due at 23h59
Mon	19 Oct.	2:30 p.m. Lyman Duff Medical Building, Amphitheater Lecture: Overview of Section 2 Lab and Plaque assays
Mon	19 Oct.	Midterm Exam / evening exam / location to be determined
Wed	21 Oct.	1:30 p.m. Laboratory cubicles: Laboratory: Titration of Bacteriophage 2972
Fri	23 Oct.	1:30 p.m. Laboratory cubicles Follow up: Calculate concentration of Bacteriophage 2972
Mon	26 Oct.	2:30 p.m. Lyman Duff Medical Building, Amphitheater Lecture: CRISPR-Cas system and Bacteriophage-Insensitive Mutants (BIMs)
Wed	28 Oct.	1:30 p.m. Laboratory cubicles: Laboratory: Generate Bacteriophage-Insensitive Mutants (BIMs)
Fri	30 Oct.	1:30 p.m. Laboratory cubicles Follow up: Count and grow BIMs
Mon	2 Nov.	2:30 p.m. Lyman Duff Medical Building, Amphitheater Lecture: Characterizing BIMs and the CRISPR-Cas system
Wed	4 Nov.	1:30 p.m. Laboratory cubicles: Laboratory: Perform PCR of BIMs
Fri	6 Nov.	1:30 p.m. Laboratory cubicles Follow up: Run PCR products on agarose gel and send for sequencing
Mon	9 Nov.	2:30 p.m. Lyman Duff Medical Building, Amphitheater Lecture: CRISPR-Cas system and phage mutation
Wed	11 Nov.	1:30 p.m. Laboratory cubicles: Laboratory: Quantify phage resistance of BIMs
Fri	13 Nov.	1:30 p.m. Laboratory cubicles Follow up: Count plaques, calculate EOP and grow up phage from plaque
Mon	16 Nov.	2:30 p.m. Lyman Duff Medical Building, Amphitheater Lecture: Genome editing and DNA extraction
Wed	18 Nov.	1:30 p.m. Laboratory cubicles: Laboratory: Extract DNA from mutated phage and send for sequencing
Fri	20 Nov.	
Mon	23 Nov.	2:30 p.m. Lyman Duff Medical Building, Amphitheater Lecture: Analysis of sequences and conclusion of lab
Wed	25 Nov.	1:30 p.m. Laboratory cubicles: Laboratory: Analyze BIM and phage sequences
Fri	27 Nov.	Evaluate lab notebooks
Mon	02 Dec.	Lab report #3 due at 23h59

Class recording

The pre-lab lectures will be recorded to allow you to review material outside of scheduled class time. Class recordings do not replace a student's presence in a class; rather, they provide complementary pedagogical support for student learning. The recordings will be uploaded 24 hr after the lecture date on MyCourses.

Intellectual property considerations

"I ask for everyone's cooperation in ensuring that this [video] and associated material are not reproduced or placed in the public domain. This means that each of you can use it for your own purposes, but you cannot allow others to use it by posting it online or giving it or selling it to others who may copy it and make it available. Thank you very much for your help with this."

Inclusive Learning Environment

This course is designed to help you learn to communicate professionally both during your time at McGill and in your future workplaces. In keeping with McGill's policies on student rights and responsibilities, it is expected that during class discussions and small group interactions you will communicate constructively and respectfully. Sexist, racist, homophobic, ageist, and ableist expressions will not be tolerated in the classroom or during group meetings held outside of class.

McGill is committed to providing an inclusive and supportive learning environment. If you experience barriers to learning in this course, do not hesitate to discuss them with your instructor. If you have a special learning need or disability, you are encouraged to contact the Office for Students with Disabilities: <https://www.mcgill.ca/osd/>.

Health and Wellness

Student wellbeing is a priority for the University. To help students find the support they need as quickly as possible, all of McGill's health and wellness resources have been integrated into a single [Student Wellness Hub](#), a one-stop shop for everything related to physical and mental health. If you need access to services or would like more information, you are strongly encouraged to visit the Virtual Hub:

<https://www.mcgill.ca/wellness-hub/>. As the instructors of this course we endeavor to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with me and the [Office for Students with Disabilities](#), 514-398-6009.

McGill Writing Centre Tutorial Service

Writing well is key to both academic and professional success. The McGill Writing Centre (MWC) offers credit courses in academic and professional writing, and a tutorial service open to all McGill students: <https://www.mcgill.ca/mwc/tutorial-service>. The tutorial service offers one-to-one sessions with seasoned instructors and experienced tutors who will work with you at any stage of the writing process.

During the campus closure period, there will be no tutors on site and no administrative staff at the MWC to answer inquiries. Tutoring sessions will be conducted online via the Microsoft Teams platform. This application is available for free to all students through Office 365: <https://www.mcgill.ca/it/office365-software>. For information about how to book an appointment through Microsoft Teams, please go to <https://www.mcgill.ca/mwc/tutorial-service>.

McGill Library

Discover the McGill Library's rich array of resources. Watch a short welcome video in English, French, Arabic, Chinese, Hindi, Persian, Spanish, or Urdu: <https://www.mcgill.ca/library/orientation>.

McGill University Policy Statements

1) “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 (see <http://www.mcgill.ca/integrity> for more information).”

“L'université McGill attache une haute importance à l'honnêteté académique. Il incombe par conséquent à tous les étudiants de comprendre ce que l'on entend par tricherie, plagiat et autres infractions académiques, ainsi que les conséquences que peuvent avoir de telles actions, selon le Code de conduite de l'étudiant et des procédures disciplinaires (pour de plus amples renseignements, veuillez consulter le site www.mcgill.ca/integrity).”

2) “In accord with McGill University’s Charter of Student’s 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 les cours dont l’un des objets est la maîtrise d’une langue).”

3) “In the event of extraordinary circumstances beyond the University’s control, the content and/or evaluation scheme in this course is subject to change.”

4) McGill has policies on sustainability, paper use and other initiatives to promote a culture of sustainability at McGill.

5) If you have a disability please contact the instructor to arrange a time to discuss your situation. It would be helpful if you contact the Office for Students with Disabilities at 514-398-6009 before you do this.

6) © Instructor generated course materials (e.g., handouts, notes, summaries, exam questions, etc.) are protected by law and may not be copied or distributed in any form or in any medium without explicit permission of the instructor. Note that infringements of copyright can be subjected to follow up by the University under the Code of Student Conduct and Disciplinary Procedures.

7) “End-of-course evaluations are one of the ways that McGill works toward maintaining and improving the quality of courses and the student’s learning experience. You will be notified by e-mail when the evaluations are available on Mercury, the online course evaluation system. Please note that a minimum number of responses must be received for results to be available to students.”

8) Additional policies governing academic issues which affect students can be found in the McGill Charter of Students’ Rights and Responsibilities (www.mcgill.ca/files/secretariat/Handbook-on-Student-Rights-and-Responsibilities-2010.pdf).

9) This course outline has been modified to meet the requirements of PASL. Assessments in this course are governed by the [Policy on Assessment of Student Learning](#) (PASL), which provides a set of common principles to guide the assessment of students’ learning. Also see [Faculty of Science-specific rules](#) on the implementation of PASL.