SEA-PHAGES: Phage Discovery
MIMM 390 FALL 2025

Course Outline

Course Coordinator and instructor
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General Information

Course #	MIMM 390
Term	Fall
Year	2025
Course pre-requisite(s)	MIMM 211, MIMM 212, BIOL 200
Course co-requisite(s)	MIMM 323, MIMM 384, MIMM 324
Class times	Students must attend lectures and lab sessions (Tuesdays & Thursdays)
Start/End dates	Tuesday September 2nd, 2025 / Tuesday December 2nd, 2025
Lecture	**Tuesdays,** from 1:00pm – 2:00pm (Room 507-509, Duff)
Laboratory sessions	**Tuesdays**, immediately following the lecture – 4:30pm and **Thursdays,** from 1:00pm – 4:30pm (Room D6, Duff)
Number of credits	3

Office hours (incl. virtual)	Mondays at 2:30pm and by appointment
Communication plan	Available via email (expect a 2-day response time); meetings and office hours can be held via Zoom

Course Description

Bacteriophages (phages) are the most abundant viruses found on Earth, found in every known microbial system. These viruses are unique to bacteria, and play essential roles in global biogeochemical cycles, microbial nutrient turnover, bacterial evolution, the development of molecular biology tools, human health, and the fight against antibiotic-resistant pathogens, amongst others. As part of the SEA-PHAGES (Science Education Alliance-Phage Hunters Advancing Genomics and Evolutionary Science) research team, this course covers theoretical microbiology and molecular biology content about phages. Students then lead their individual experiments to isolate and characterize a novel phage from a variety of environmental samples, following experimental procedures developed by the Howard Hughes Medical Institute (HHMI).

Learning Objectives

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

- Describe fundamental molecular and virology laboratory techniques,
- Conduct experimental techniques routinely used in biomedical laboratories appropriately,
- Analyze and interpret experimental data produced from laboratory experiments,
- Keep a detailed and properly formatted laboratory notebook,
- Communicate scientific findings and constructive feedback in written and oral forms,
- Read and critically discuss scientific research articles,

McGill University is on land which has long served as a site of meeting and exchange amongst Indigenous peoples, including the Haudenosaunee and Anishinabeg nations. We acknowledge and thank the diverse Indigenous people whose footsteps have marked this territory on which peoples of the world now gather.

L'Université McGill est sur un emplacement qui a longtemps servi de lieu de rencontre et d'échange entre les peuples autochtones, y compris les nations Haudenosaunee et Anishinabeg. Nous reconnaissons et remercions les divers peuples autochtones dont les pas ont marqué ce territoire sur lequel les peuples du monde entier se réunissent maintenant.

Course Format and technologies

- This course is designed to have students lead their own experiments and experience real-world scientific research. As such, this course is mostly lab-based. There will be weekly lectures of approximately **60 mins on Tuesdays**, designed to provide students with theoretical knowledge about phage biology, introduce and/or refine lab procedures and concepts, outline the lab and homework planned, and to clarify any questions students may have. The remaining scheduled time (5h/week) will consist of experiments in the lab. On **Thursdays**, students should head directly to the lab, unless specified otherwise in the course schedule.

- All experimental protocols can be found in the online laboratory manual: https://seaphagesphagediscoveryguide.helpdocsonline.com/home. This link will also be provided on **myCourses**. Students will also use supplemental experimental procedures that have been optimized for MIMM 390, provided as the **Annex**. Students will use a variety of online resources such as **SEA-PHAGES platform, PhagesDB, Google Drive, polling @McGill** (see below for how to use). Tutorial video links to various experimental techniques will also be uploaded on **myCourses** to support students' learning.

- This course mimics a real research lab, so it's expected that students will have to repeat and/or optimize experiments, progress at different paces, and obtain distinct results (even none in some cases!). The course schedule was built with this in mind, allowing enough for all students to understand and complete the experimental benchmarks by the end of the term.

- This course contains different types of assessments, with different weights assigned to them. All the information regarding these assessments (guidelines, rubrics, examples if applicable) will be uploaded on **myCourses** at the start of the term. Each assessment will have its own tab and content. Students may use artificial intelligence tools, including generative AI (*e.g.,* ChatGPT, Microsoft Copilot) in this course as a learning aid or to help produce assignments. However, **students are ultimately accountable for the work submitted**. Any content produced by an AI tool must be cited appropriately and documented in an appendix for each assignment, as applicable (see https://style.mla.org/citing-generative-ai/). The documentation should include what tool(s) were used, how they were used (*i.e.*, the prompt), and how the results from the AI were incorporated in the submitted work.

- For questions regarding protocols, experimental results, and assessments, please contact the course TAs. For questions regarding missed labs and assessments/grades, please contact the course coordinator, Dr. Corinne Maurice. If you are absent for a lab, please notify the course instructor and the TAs. *Marks will not be deducted for missing a lab session, as the goal is for students to complete the experimental benchmarks by the end of the term. In the case of multiple absences, a doctor's referral/note may be requested by the course coordinator.*

Polling @McGill:
During a class with polling questions, students will respond to questions from the instructor from a personal device (smartphone, tablet, or laptop). Polling will be available through www.mcgill.ca/polling. To participate in Polling sessions, you **MUST** first register for an account by clicking on **Register Your Account** at www.mcgill.ca/polling and logging in with your McGill username and password. Follow the prompts to agree to the terms of use and create your account. For more information, please visit the **Getting Started for Students** section at www.mcgill.ca/polling. For any technical problems with polling, please contact the IT Service Desk: http://www.mcgill.ca/it/get-started-it/need-help.

To maintain a safe and respectful classroom environment, please ensure that any polling responses submitted are appropriate and relevant to the question asked. Please note that unless the poll is labelled as anonymous, your responses are identifiable to the instructor. Please see the Code of Student Conduct and Disciplinary Procedures.

Expectations for Student Participation

Student participation is a key aspect of this course. Students are expected to engage in class discussions and their participation will be assessed. This class relies on student engagement and their ideas. As a research project course, students are expected to think critically and interact with their fellow classmates to answer questions and complete assignments.

Required Course Materials

Students are expected to read the specific sections from the online Phage Discovery Guide and to upload some of their assignments on **Google Drive**. The assigned readings will be uploaded on **myCourses.**

Course Content

In this course, students will learn about bacteriophage biology, the SEA-PHAGES program and virology, microbiology, and molecular biology techniques. The course will consist of lectures about bacteriophage biology, introduction to all the laboratory techniques used in the course, how to keep lab notebooks, journal clubs, and discussions about future experiments and interpreting data. The experimental benchmarks evaluated throughout the semester are detailed below:

Experimental benchmark (total grade: 15%)	**% of grade**
Aseptic microbiology techniques	4
Phage isolation and purification	2
Serial dilution and phage titration	3
Phage propagation for high titer stock	1.5
Molecular characterization of phage DNA	3
Lab preparedness and EHS compliance	1.5
Further characterization of bacteriophages	*Optional*

Evaluation

Students will submit a final graded report at the end of the semester. Students will be asked to write a draft report prior to the final report. Students will be assessed on their participation in class discussions, an oral presentation, a journal club, their lab notebooks, their lab performance, and mini-assignments that will strengthen their understanding of bacteriophage discovery. This course is designed to ensure students learn from each other. The assignments (outline, expectations, and rubrics) will be clearly described on **myCourses** and during class sessions on Tuesdays to ensure students understand what is expected of them.

There will be a 5% penalty per day for late assignment submissions. If for any reason, the student cannot submit an assignment on time, they must email Dr. Maurice prior to the deadline of the assignment. Assignments should be submitted *via* **myCourses**, unless specified otherwise.

The schedule of the different assignments and their associated grades are listed below:
(TA: Teaching Assistant).

Name of Assignment	**Due Date**	**% of final grade**	**Evaluator**
Relevance of phage research video	September 5th, 2025	4	TAs
Lab notebook (2x)	Evaluation #1: 02 Oct (3%) Evaluation #2: 27 Nov (6%)	9	TAs
Experimental benchmarks	Throughout semester	15	CM TAs
Journal Club	Mid-semester	12.5	CM TAs
Report outline	October 23rd, 2025	5	TAs

Name of Assignment	Due Date	% of final grade	Evaluator
Lab performance	Throughout semester	5	CM TAs
Phage Topic presentation	Five presentation dates. Sign up for presentation slot by Sept 19.	12.5	CM TA
Class and lab participation + feedback on oral presentations	Throughout semester	5	CM TAs
Draft report + Interactive coversheet	Interactive coversheet (4%): Nov. 6th Draft report (8%): Nov. 6th	12	TAs
Final report	December 2nd, 2025	20	CM TAs

McGill Policy Statements

Language of Submission

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. This does not apply to courses in which acquiring proficiency in a language is one of the objectives.

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).

Academic Integrity

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 McGill's guide to academic honesty 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 guide pour l'honnêteté académique de McGill).

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/.

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.

Additional Statements

- The University Student Assessment Policy exists to ensure fair and equitable academic assessment for all students and to protect students from excessive workloads. All students and instructors are encouraged to review this Policy, which addresses multiple aspects and methods of student assessment, e.g. the timing of evaluation due dates and weighting of final examinations.

- © Instructor-generated course materials (e.g., handouts, notes, summaries, exam questions) 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 subject to follow up by the University under the Code of Student Conduct and Disciplinary Procedures.

- As the instructor of this course, I 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.

- End-of-course evaluations are one of the ways that McGill works towards 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. Please note that a minimum number of responses must be received for results to be available to students.

- 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 (see document).

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