LABORATORY IN IMMUNOLOGY
MIMM 385 WINTER 2023

COURSE OUTLINE

COURSE COORDINATORS

Prof Sylvie Fournier
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Prof Samantha Gruenheid
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COURSE DEVELOPERS

Sylvie Fournier
Jasmin Kaur Chahal
Claire Trottier
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COURSE DESCRIPTION

This laboratory course allows students to gain expertise in following protocols and performing key techniques in immunology. Students also develop basic experimental design and scientific thinking skills by designing their own experiment based on available reagents to solve a problem. Students learn to keep a lab book and communicate scientific findings in written and oral forms.

LEARNING OBJECTIVES

- Perform key laboratory techniques in immunology
- Demonstrate ability to follow an experimental protocol
- Use a lab book to keep a thorough record of laboratory work
- Plan tasks in advance and develop effective time management
- Propose appropriate scientific hypotheses and approaches
- Design, plan, and carry out an experiment based on available reagents to solve a problem
- Record, analyze and interpret scientific data
- Communicate scientific findings clearly in written and oral forms
- Work effectively in a team
- Provide constructive feedback to peers

PREREQUISITES

MIMM 212 Laboratory in Microbiology
MIMM 214 Introduction to Immunology

TIMETABLE

Mondays 2:30-3:30 PM
Lyman Duff Medical Building Amphitheater

Wednesdays 1:30-5:30 PM
Laboratory Cubicles, C floor of the Lyman Duff Medical Building

Fridays 1:30-3:30
Laboratory Cubicles, C floor of the Lyman Duff Medical Building

TEACHING ASSISTANTS

TBD

LABORATORY COORDINATOR

David Gagnon, PhD
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FLOWJO WORKSHOP FACILITATOR

Christian Young
Manager, Flow Core Facility, Lady Davis Institute
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COURSE CONTENT & INSTRUCTIONAL APPROACH

Students work in teams (2-3 students).

Each team is assigned to a dedicated TA.

Each TA supervises a group of 6-7 teams.

Two scientific aspects will be developed in this course:

Section 1: Key techniques in immunology

This section focuses primarily on developing technical, hands-on skills for four key techniques in immunology: mammalian cell culture (CC), flow cytometry (FC), enzyme-linked immunosorbent assay (ELISA), and quantitative reverse-transcription polymerase chain reaction (RT PCR).

These key techniques will be performed according to a rotation schedule (see Table 1 below). The class will be divided into 8 groups, each with its own TA. These 8 groups will rotate through the four key techniques over a four-week period, as shown below. All four techniques will be performed to test a single hypothesis. The primary assessment for this section will be an individual research report that includes data from all four experiments.

TABLE 1: GROUP ROTATIONS FOR SECTION 1

	Group A	**Group B**	**Group C**	**Group D**
Jan-25	FLOW	CC	RT PCR	RT PCR
Feb-01	RT PCR	RT PCR	FLOW	CC
Feb-08	CC	FLOW	ELISA	ELISA
Feb-15	ELISA	ELISA	CC	FLOW

	Group E	**Group F**	**Group G**	**Group H**
Jan-25	CC	RT PCR	FLOW	RT PCR
Feb-01	RT PCR	FLOW	RT PCR	CC
Feb-08	FLOW	ELISA	CC	ELISA
Feb-15	ELISA	CC	ELISA	FLOW

Section 2: Scientific skills in a problem-based situation

This section focuses on allowing students to develop their scientific thinking skills. Students will be presented with a scientific problem and will propose different hypotheses to explain the problem. They will develop and refine an experimental plan to test one of these hypotheses using available reagents, carry out their own experiment, analyze and interpret the data, and present their findings at a poster presentation.
The goal of this section is for students to explore the scientific method and improve their scientific thinking skills.

TABLE 2: COURSE CALENDAR

Week	Day	Date	Course content
1	M	09-Jan	Introduction to MIMM 385
	W	11-Jan	Research problem discussion Group A: D13 Group B: 507 Group C: Sheldon Group D: C10 Group E: C11 Group F: C13 Group G: 333 Group H: 321
	F	13-Jan	
2	M	16-Jan	Lecture: Flow cytometry (includes in class problem)
	W	18-Jan	Cell culture demonstration
	F	20-Jan	Cell culture demonstration
3	M	23-Jan	Lecture: RT PCR (includes in class problem)
	W	25-Jan	Group rotations: FLOW, RT PCR, CC (see table 1)
	F	27-Jan	Flow cytometry workshop Follow up RT PCR Follow up CC
4	M	30-Jan	Lecture: ELISA (includes in class problem)
	W	1-Feb	Group rotations: FLOW, RT PCR, CC (see table 1)
	F	3-Feb	Flow cytometry workshop Follow up RT PCR Follow up CC
5	M	6-Feb	In class problem on Flow cytometry (FLOW problem #1)
	W	8-Feb	Group rotations: ELISA, FLOW, CC (see table 1) Lab book assessment + PBA
	F	10-Feb	Flow cytometry workshop Follow up ELISA Follow up CC
6	M	13-Feb	In class problem on ELISA Instructions for research report section 1
	W	15-Feb	Group rotations: ELISA, FLOW, CC (see table 1)
	F	17-Feb	Flow cytometry workshop Follow up ELISA Follow up CC
7	M	20-Feb	Introduction to section 2

	W	22-Feb	Hypothesis workshop Lab book assessment + PBA
	F	24-Feb	Electronic submission (Word format) of your research report for section 1 to your TA. Deadline 11h59pm. Assignment of section 2 experiments
	M	27-Feb	**Reading Week**
	W	1-Mar	**Reading Week**
	F	3-Mar	**Reading Week**
8	M	6-Mar	Prof Fournier available to provide help with your experimental plan
	W	8-Mar	Teams work on experimental plan with their TA
	F	10-Mar	Electronic submission (Word format) of Version 1 of your experimental plan to your TA. Deadline 11h59pm.
9	M	13-Mar	Problem on Flow cytometry (FLOW problem #2 (formally evaluated))
	W	15-Mar	TA feedback on experimental plan
	F	17-Mar	Teams work on experimental plan (TAs present from 1:30-3:30)
10	M	20-Mar	Electronic submission (Word format) of Version 2 of your experimental plan to your TA. Deadline 5pm.

	W	22-Mar	Experiment section 2
	F	24-Mar	Experiment section 2
11	M	27-Mar	
	W	29-Mar	Data analysis of section 2 experiment
	F	31-Mar	Teams work on oral presentation
12	M	3-Apr	Teams work on oral presentation
	W	5-Apr	Guidance from TA for oral presentation (mandatory) Lab book assessment + PBA
	F	7-Apr	**Good Friday**
13	M	10-Apr	**Easter Monday**
	W	12-Apr	Oral presentations

COURSE MATERIAL

Instructions, protocols, assigned readings and videos will be posted on myCourses

COURSE ASSESSMENTS

Below is a brief description of the assessments in this course. More detailed descriptions of these assessments (including grading rubrics) will be posted on myCourses and discussed during class time.

1) Lab book

Each student is required to purchase a lab book. This lab book should have numbered pages and a hard cover. Examples will be shown in class. Each student is required to write down all flow charts, plans, observations, calculations and data in their lab book. TAs will formally assess your lab book 3 times during the semester (8-Feb, 22-Feb, 29-Mar). The first instance will be worth 1%, the second 3% and the final instance will be worth 5%.

2) Performance-based assessment (PBA)

TAs will be using a detailed checklist to assess each student on their laboratory practices (e.g. time management, level of preparedness) and team work and self-regulation (e.g. sharing responsibilities, contributions to group discussion). TAs will conduct a PBA three times during the semester (8-Feb, 22-Feb, 29-Mar). The first instance will be worth 2%, the second 3% and the final instance will be worth 4%.

3) In class problems

There will be in class problems on some Mondays as indicated in the course calendar above. You will be marked based on completion of these problems. Each in class problem session is worth 1 point.
There will be a second in class problem on flow cytometry that will be formally evaluated. This fully corrected problem will be worth 6%.

4) Research report

Each student will submit one research report for section 1. The report is worth 21 marks.

5) Oral presentation

Each team will give an oral presentation of their experimental plan and data from section 2. The oral presentation is worth 21 marks.

6) Experimental Plan

Each team will be required to develop their own experimental plan in two stages. Students will submit “version 1” of their experimental plan to their TA for feedback. Version 1 is worth 17 marks. TAs will read “version 1” carefully and provide feedback to improve the experimental plan. Each group will then incorporate this feedback to create the final “version 2” of their experimental plan, which they will use to carry out their

own experiment. Version 2 MUST be submitted with the original copy of version 1 attached (including TA comments). Version 2 is worth 8 marks.

8) Peer feedback on oral presentation
Each student will be required to give feedback on two oral presentations of their peers. You will be marked based on completion of this feedback task.

9) Peer evaluation
Each student will be evaluated by their team member(s) according to an assigned rubric. The average of this mark will count toward the peer evaluation mark, for a total of 3%. The deadline to hand in the peer evaluation(s) to your TA is the last session of the poster presentations. If a student does not submit evaluations for their peers by this deadline, they will receive a mark of 0 for their own peer evaluation.

IMPORTANT NOTES
A 5% deduction will be applied for each day of late submission for the lab report and for both versions of the experimental plan. A mark of zero will be given for any assignment submitted beyond 4 days after the due date.

Attendance to laboratory sessions is mandatory. A documented excuse (e.g. doctor's note) should be submitted to Prof Fournier for missing a lab session.

A documented excuse (e.g. doctor's note) should also be submitted to Prof Fournier for missing your final poster presentation. If a documented reason is provided for missing your poster, your final mark for this section will be made up of all the other marks for this section.

The marks provided by the TAs for the research report, the experimental plan or the oral presentation may be normalized by the course coordinators if there are large discrepancies between the grading scales of the different TAs.

TABLE 3: MARK BREAKDOWN

	%
Lab book	9
Performance-based assessment	9
In class problems	5
Flow cytometry problem #2	6
Peer evaluation	3
Research report for Section 1	21
Version 1 of experimental plan	17
Version 2 of experimental plan	9
Oral presentation	21
TOTAL	**100**

MCGILL UNIVERSITY 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.
"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/students/srr/honest/).

"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.

"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."

"End-of-term 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 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."

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

"In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change."

"Any midterm examination, quiz, essay, problem set, laboratory report, or other assignment, should be marked in a reasonable time frame and although the work may be retained by the University, the student will receive feedback on expected and achieved outcomes (within 2-3 weeks from the date of the test/assignment)."