

LABORATORY IN IMMUNOLOGY

MIMM 385 WINTER 2020

COURSE OUTLINE

COURSE COORDINATOR

Dr. Sylvie Fournier
Lyman Duff Medical Building, Room 408
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COURSE DEVELOPER

Dr. 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 demonstrate 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 form
- Respect laboratory safety guidelines
- Work effectively in a team
- Provide constructive feedback to peers

PREREQUISITES: MIMM 212 Laboratory in Microbiology, MIMM 214 Introduction to Immunology

COREQUISISTE: MIMM314 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 STAFF

Aghdas Zamini aghdas.zamini@mcgill.ca

Richard Arthur Richard.arthur@mcgill.ca

FLOWJO WORKSHOP FACILITATOR

Christian Young

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COURSE CONTENT & INSTRUCTIONAL APPROACH

Students will work in teams. This course is divided into two sections:

Section 1: Key Techniques In Immunology

This six-week 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 five groups, each with its own TA. These five 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 a single research report that will include data from all four experiments.

TABLE 1: GROUP ROTATIONS FOR SECTION 1

	Group A	Group B	Group C	Group D	Group E	Group F
Week 3	FLOW	CC	RT PCR	RT PCR	CC	RT PCR
Week 4	RT PCR	RT PCR	FLOW	CC	RT PCR	FLOW
Week 5	CC	FLOW	ELISA	ELISA	FLOW	ELISA
Week 6	ELISA	ELISA	CC	FLOW	ELISA	CC

Section 2: Scientific Skills In A Problem-Based Lab

This section will focus 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	06-Jan	Introduction to MIMM 385
	W	08-Jan	Research problem discussion Group A: D13 Group B: 507 Group C: Sheldon Group D: C10 Group E: C11 Group F: C13 Group G:
	F	10-Jan	
2	M	13-Jan	Lecture: Flow cytometry (includes in class problem)
	W	15-Jan	Cell culture demo
	F	17-Jan	Cell culture demo
3	M	20-Jan	Lecture: RT PCR (includes in class problem)
	W	22-Jan	Group rotations: FACS, RT PCR, cell culture (see table 1)
	F	24-Jan	Follow up
4	M	27-Jan	Lecture: ELISA (includes in class problem)
	W	29-Jan	Group rotations: FACS, RT PCR, cell culture (see table 1)
	F	31-Jan	Follow up

5	M	03-Feb	In class problem #1 on Flow cytometry
	W	05-Feb	Group rotations: ELISA, FACS, cell culture (see table 1) (lab book assessment + PBA this week)
	F	07-Feb	Follow up
6	M	10-Feb	In class problem on ELISA + Instructions for research report section 1
	W	12-Feb	Group rotations: ELISA, FACS, cell culture (see table 1)
	F	14-Feb	Follow up
7	M	17-Feb	Introduction to section 2
	W	19-Feb	Hypothesis workshop Electronic submission (Word format) of research report for section 1 due at 1pm (lab book assessment + PBA this week)
	F	21-Feb	Assignment of section 2 experiments
8	M	24-Feb	Teams work on experimental plan (amphitheater is available for team work)

	W	26-Feb	Teams work on experimental plan (TAs present from 2:00-4:00)
	F	28-Feb	Electronic submission (Word format) of Version 1 of experimental plan due at 4pm (no TAs present)
9	M	02-Mar	Reading Week
	W	04-Mar	Reading Week
	F	06-Mar	Reading Week
10	M	09-Mar	Feedback on experimental plans (TAs present)
	W	11-Mar	Teams work on experimental plan (TAs present from 1:30-3:30)
	F	13-Mar	Electronic submission (Word format) of Version 2 of experimental plan due by 4pm (no TAs present)
11	M	16-Mar	In class problem #2 on Flow cytometry

	W	18-Mar	Experiment week 1
	F	20-Mar	Experiment week 1
12	M	23-Mar	Poster presentation instructions
	W	25-Mar	Experiment week 2
	F	27-Mar	Experiment week 2
13	M	30-Mar	
	W	01-Apr	Guidance from TA for poster presentation (mandatory) (lab book assessment + PBA this week)
	F	03-Apr	Preparation of poster presentations
14	M	06-Apr	Poster presentations (1h30 PM- 4h00 PM, McIntyre room 210)
	W	08-Apr	Poster presentations (1h30 PM- 4h00 PM, McIntyre room 210)

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. The first instance will be worth 1%, the second 2% 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. The first instance will be worth 1%, 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) Poster presentation

Each team will prepare a poster and give a poster presentation of their experimental plan and data from section 2. The poster 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 poster

Each team will be required to present a poster during one of the poster sessions and to attend one other poster session. Each student will be required to give feedback on two

poster presentations from 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 on lab days is mandatory.

A documented excuse (e.g. doctor's note) should be submitted to Dr. 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.

TABLE 3: MARK BREAKDOWN

	%
Lab book	8
Performance-based assessment	8
In class problems	5
Flow cytometry problem #2	6
Peer feedback on POSTER	3
Peer evaluation	3
Research report for Section 1	21
Version 1 of experimental plan	17
Version 2 of experimental plan	8
Poster 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)."