IMM 428H/1428H Molecular Immunology 2020

This course will focus on the molecular and cellular biology of immune recognition. The emphasis of the course will be on the experimental evidence and approaches used to define current paradigms in immune recognition.

Due to concerns about COVID19, this course will be offered online, live, with chat room function enabled for asking questions. A TA will moderate the chat room.

Course objectives: At the end of this course you should:

- *Understand key experimental evidence for mechanisms of VDJ rearrangement and class switch recombination.*
- *Understand some key structural principles of receptor interactions in the immune system*
- *Understand key experiments defining T cell recognition of antigen, mechanisms of antigen presentation and costimulation*
- *Understand experimental evidence for key recognition events in innate recognition of pathogens (TLRs, NLRs, etc)*
- *Be familiar with the evidence for different subsets of innate lymphoid cells and their biology*

Grading: Undergraduate students will be graded on three non-cumulative assessments, worth 36%, 32% and 32% of the course. Graduate students will have an additional essay component, worth 20% of the course, with the other assessments weighted 80%. ***Assessment 1 and 3 will be essay questions written in a 1-hour time slot; Assessment 2 will be an assignment to make a power point presentation of a key paper with voiceover (to be assigned one week before).***

All classes will be held virtually/live using Blackboard learn live platform and lectures recordings and chats will be posted along with the PDF of the slides. Lectures will be held Tuesday/Thursday from 10:00- 10:50 AM.

Date	**Lecture Subject**	**Prof.**
Sept. 10	Introduction to the course content and operational procedures. VDJ recombination	THW AM
Sept 15	VDJ recombination	AM
Sept. 17	VDJ recombination	AM
Sept 22	Affinity Maturation and class switch	AM
Sept. 24	Affinity maturation and class switch	AM
Sept 29	Affinity maturation and class switch	AM
Oct. 1	Antibody structure	JPJ

Oct. 6	Antibody Functions and Applications	JPJ
Oct. 8	Assays used to measure MHC restriction/T cell recognition	THW
October 13	**Assessment 1: Held online during class time -questions available through Quercus at start of class for 1 hour only 10am-11am, 36% of course**	JPJ AM
October 15	T cell recognition continued	THW
October 20	Antigen Processing MHC I and II	THW
October 22	Antigen Processing MHC II	THW
Oct 27	Antigen processing MHC I	THW
Oct 29	T cell activation and costimulation	THW
Nov 3	T cell costimulation continued	THW
Nov 5	Innate pattern recognition - TLRs	DP
Nov 9-13	*Reading Week no classes (note an information session on the power point assignment will be organized this week- ahead of the assignment).*	
Nov. 17	**No class today: Assessment 2 due by midnight: Watts material- 10 minute Power point presentation with voiceover, explaining a key paper (to be assigned 1 week in advance). 32% of course grade**	TW
Nov. 19	Innate pattern recognition – cytosolic sensors	DP
Nov.24	Innate pattern recognition – cytosolic sensors, inflammasomes	DP
Nov 26	Biology and function of innate lymphoid cells	AMo
Dec 1	Biology and function of innate lymphoid cells	AMo
Dec 3	Biology and function of innate lymphoid cells	AMo
Dec 8	ILC continued	AMo
Dec 15	**Assessment 3, Philpott/Mortha material. 10-11am, 32% of course**	

Reference Material: Although there is no required text for this course, any recent edition of Janeway, Travers *et al.* Immunobiology text (e.g. 9th Edition), which most of you already have, will serve as a "first resource" for you. Instructors will be providing you with reference lists of key papers or reviews that they will be discussing. In fourth-year courses we expect you to start reading some of the primary literature. Immunology is an experimental science and you will find that in this course it is not just facts and concepts that are being relayed, but also that the experimental foundations for these facts and concepts are stressed. Thus, you may have to consult the primary literature to clarify in your mind an experimental approach which was

discussed in class but which you did not fully grasp because you were unfamiliar with it. **We highly recommend that you read the recommended papers and do the practice exam questions to become familiar with the kind of problems we ask during the assessment.**

Review Sessions: Although you are always free to seek out individual instructors for clarification of the lecture material, for the past several years the classes have found it useful that we held some group review sessions at which TA and/or instructors were present to answer questions posed by the students. These are strictly optional and no new material is deliberately presented. A group review session will be held by zoom or on Blackboard learn, a few days before each assessment- to be arranged by the TA for each section (link to be provided in the Quercus portal). For the power point assignment, TA will be available to answer questions on the assignment at a pre-arranged time.

Examinations: There will three non-cummulative assessments, as discussed above.

Assessment 1: will be worth **36%** of the final mark and will cover the first 8 lectures. It will be a 1 hour open book long answer examination held online during class time. The questions will cover on the material covered by Dr. Julien (9% of course) and Dr. Martin's lectures (27%) and will be provided online at the start of the class period. **Assessment 1 grade will be made available before the drop date.**

Drop date:
Undergraduates: Nov. 9, 2020
Graduate students: October 26, 2020

Assessment 2: will be worth **32%** of the final mark and will cover Dr. Watts' 7 lectures. Power point presentation with voice over. Due the first class after reading week. The presentation will be to do a 10 minute "journal club" type presentation of a key paper to be assigned November 10, with a due date of November 17 at midnight. Students will receive their specifically assigned paper one week before the due date by email.

Assessment 3 will be held Dec 15, 10-11am and is worth 32% of the final mark and will consist of essay questions which will be posted online at the start of the time period: **Dr. Philpott 16% and Dr. Mortha 16%**

Missed tests: Students who miss an examination must provide a *verification of student illness or injury form** signed by a qualified physician and stamped with their address and phone number, otherwise a mark of zero will be assigned for that examination. This can be sent by email, with the understanding that the original must be retained for when it is safe to provide it to the Immunology office. Only 1 make up exam will be scheduled for missed tests, normally within 1-2 weeks after the missed test.

*http://www.illnessverification.utoronto.ca/document/Verification%20of%20Student%20Illness%20(VOI)%20-%20March%207%202018%20-%20AODA.pdf

Accessibility Needs: The University of Toronto is committed to accessibility. If you require accommodations for a disability, or have any accessibility concerns about the course, the classroom or course materials, please contact Accessibility Services as soon as possible: disability.services@utoronto.ca or http://studentlife.utoronto.ca/accessibility."

Molecular Immunology for Graduate Students: IMM 1428H

IMM1428 is available as a graduate course. Note: Students in the Immunology Ph.D. program cannot use IMM1428 as part of their graduate credit requirement.

TERM PAPER FOR GRADUATE STUDENTS: For students enrolled in IMM1428H there will be an additional component in evaluating your performance in this course. You will be required to write a term paper of 10-12 double spaced pages in length on any major topic in the course. You may not, however, choose a topic that is closely related to your own research area. You are free to discuss possible topics with any of the instructors and you must obtain approval from the course coordinator (Dr. Watts) for your essay topic in advance. We are looking for an essay that demonstrates your critical thinking/evaluation of a focused area related to any topic touched on in the course not in your immediate research area. This approval must be obtained by **November 6, 2020.** For grading purposes, the essay will contribute 20% of the final aggregate mark, the balance being made up of the three assessments. Essays must be handed in as a PDF uploaded to the Quercus site. **Due Date-December 4, 2020.** Essay will be graded by the course coordinator with potential input from another faculty member with expertise in the area.

Academic integrity statement: "Academic integrity is fundamental to learning and scholarship at the University of Toronto. Participating honestly, respectfully, responsibly, and fairly in this academic community ensures that the U of T degree that you earn will be valued as a true indication of your individual academic achievement and will continue to receive the respect and recognition it deserves." See **http://www.artsci.utoronto.ca/osai/instructors/downloadable-templates/ai-statements-checklist** .

Instructors:

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JPJ: Jean-Philippe Julien, Ph.D.
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AM: Alberto Martin, Ph.D.
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AMo Arthur Mortha , Ph.D.
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TAs:

TA part I (Julien and Martin lectures) Qiaochu Irene Lin qiaochu.lin@mail.utoronto.ca

TA part II (Watts lectures) Alec Luchak alexander.luchak@mail.utoronto.ca

TA part III (Philpott, Mortha lectures): Mark Gower mark.gower@mail.utoronto.ca