

MIJ485H1 S

Vaccines and Immunity

Winter 2026 Syllabus

Course Meetings

MIJ485H1 S

Section	Day & Time	Delivery Mode & Location
LEC0101	Wednesday, 2:00 PM - 5:00 PM	In Person: MS 4171

Refer to ACORN for the most up-to-date information about the location of the course meetings.

Course Contacts

Instructor: Dr. Mario Ostrowski

Email: m.ostrowski@utoronto.ca

Office Hours and Location: Please begin the subject line with MIJ485 for any email correspondence for this course.

Teaching Assistant: Sonia Jarvie

Email: sonia.jarvie@mail.utoronto.ca

Additional Notes: Please reach out to the Teaching Assistant for questions regarding this course, who will coordinate with the instructors as required. Please begin the subject line with MIJ485 for any email correspondence for this course.

Coordinator: Dr. Scott Gray-Owen

Email: scott.gray.owen@utoronto.ca

Additional Notes: Please begin the subject line with MIJ485 for any email correspondence for this course.

Course Overview

Analysis of the strategies used by pathogenic microbes to evade specific and innate immune responses, and the strategies used to combat infectious disease using vaccines, with an emphasis on molecular and immunological aspects. Special topics include: molecular basis of pathogenicity and immune-evasion strategies; vaccination strategies; challenges to vaccine implementation (given jointly by the Departments of Molecular Genetics and Immunology).

Prerequisites: (IMM340H1/IMM341H1), (IMM350H1/IMM351H1), MGY377H1, MGY378H1

Corequisites: None

Exclusions: MBY480H1, MGY485H1

Recommended Preparation: None

Credit Value: 0.5

Marking Scheme

Assessment	Percent	Details	Due Date
Midterm Exam	25%		2026-02-11
Research Proposal	20%		2026-03-11
Presentation	15%		2026-02-25 - 2026-04-01
Presentation Summary	5%		2026-04-01, 2026-03-25, 2026-03-18, 2026-03-11, 2026-03-04, 2026-02-25
In-Person Final Exam	35%		Final Exam Period

Exams: The exams from this course will *not* be strict regurgitation of material. Rather, questions will require that ideas from different parts of this course (including student presentations) and/or from other courses that you have taken be brought together to consider, interpret and/or develop a research strategy to understand information that is provided. These questions do not typically have a single answer, since the answer may be approached from different perspectives depending upon students' interests. Thus, it is critical that written responses to the problem are clearly rationalized so that grading can take into account your approach taken and your assumptions made in answering the question.

Student Presentation & Research Proposal:

- **See detailed instructions for presentation and proposal, provided separately on Quercus.**
- **Student presentation slides** must be uploaded via Quercus at least 1 hr prior to class on the relevant presentation day.
- Late submission of the **research proposal** will result in a penalty of 10% of grade per week taken off the paper's grade.
- Normally, students will be required to submit their course essays to the University's plagiarism detection tool for a review of textual similarity and detection of possible

plagiarism. In doing so, students will allow their essays to be included as source documents in the tool's reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of this tool are described on the Centre for Teaching Support & Innovation web site (<https://uoft.me/pdt-faq>).

- **While generative AI tools may be used to help research a topic, the submitted research proposal may not be written by AI software or tools** – use of AI will be considered an offence under the U of T's Code of Behaviour on Academic Matters, and may be sanctioned accordingly. Please refer to the U of T's guidance on generative AI usage at: <https://www.academicintegrity.utoronto.ca/perils-and-pitfalls/using-chatgpt-or-other-ai-tool-on-a-marked-assessment/>
- Listing of any reference that is not a valid publication (such as hallucinated by AI and/or inappropriate because it does not support the statement made) **may lead to the paper receiving a grade of 0%.**

Presentation Summary (5% of final grade): Each student will submit a "Summary Statement" for 5 groups of the student presentations through Quercus (1% per day). If you are scheduled to present in an 'a' group, then you will be responsible for summarizing the 'b' group presenters for the term, if you are a 'b' group presenter, then you will be responsible for summarizing 'a' group presenters. To be clear, a single submission will typically have summaries for the ~3 students who presented on a particular day. Grades will be 1% per day, for a maximum of 5%. Each Summary will consist of two components for each student presentation that day:

1. a) 2-3 sentence summary describing the topic area and take-home message, and...
2. b) 1 question arising from the presentation (this should be a question that you have - not one copied from the presenter's slides! If you ask the student presenter a question in class, you can still use that question in your submitted form).

****Note:** The 'Presentation Summary' is intended to reflect each student's engagement with the student presentations, and should be able to be completed during class. Quercus will accept submissions until the beginning of the next lecture (it will close Wednesday at 2:00 on the following week). Full marks will, therefore, be awarded for submission of a complete and comprehensible Summary Statement – they will not be graded for grammar or style. For each class, 1% of the final grade will be awarded upon submission of Summary Statements for that week's group 'a' or 'b' presentations, to a maximum of 5% of the final grade. To be clear, this means that full marks will be awarded upon submission of 5 Summary Statements, so students will not need to submit a Summary Statement for every week in which student presentations occur.*

Policies & Statements

Late/Missed Assignments

This item is listed here to remind you to include your late/missed assignment policy; if you have late penalties, you are required to publish them in your syllabus. Please see the [A&S Academic Handbook \(https://www.artsci.utoronto.ca/faculty-staff/teaching/academic-handbook\)](https://www.artsci.utoronto.ca/faculty-staff/teaching/academic-handbook) sections on missed term work (Section 4.7), late term work and extensions (section 4.8), and missed term tests (Section 5.3) for more information.

Plagiarism Detection Tool

Normally, students will be required to submit their course essays to the University's plagiarism detection tool for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the tool's reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of this tool are described on the Centre for Teaching Support & Innovation web site (<https://uoft.me/pdt-faq>).

Academic Integrity

All suspected cases of academic dishonesty will be investigated following procedures outlined in the [Code of Behaviour on Academic Matters \(https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019\)](https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019). If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, please reach out to me. Note that you are expected to seek out additional information on academic integrity from me or from other institutional resources. For example, to learn more about how to cite and use source material appropriately and for other writing support, see the U of T writing support website at <http://www.writing.utoronto.ca>. Consult the Code of Behaviour on Academic Matters for a complete outline of the University's policy and expectations. For more information, please see [A&S Student Academic Integrity \(https://www.artsci.utoronto.ca/current/academic-advising-and-support/student-academic-integrity\)](https://www.artsci.utoronto.ca/current/academic-advising-and-support/student-academic-integrity) and the [University of Toronto Website on Academic Integrity \(https://www.academicintegrity.utoronto.ca\)](https://www.academicintegrity.utoronto.ca).

Quercus Info (if using)

This Course uses the University's learning management system, Quercus, to post information about the course. This includes posting readings and other materials required to complete class activities and course assignments, as well as sharing important announcements and updates. New information and resources will be posted regularly as we move through the term. To access the course website, go to the U of T Quercus log-in page at <https://q.utoronto.ca>. SPECIAL NOTE ABOUT GRADES POSTED ONLINE: Please also note that any grades posted are for your information only, so you can view and track your progress through the course. No grades are considered official, including any posted in Quercus at any point in the term, until they have been formally approved and posted on ACORN at the end of the course. Please contact me as soon as possible if you think there is an error in any grade posted on Quercus.

Additional Content

STUDENT PRESENTATION & RESEARCH PROPOSAL:

Students will each select a topic that is relevant to this course and interesting to themselves, and then present a seminar and submit a research proposal focused on these (further details below). The course program can be used to give you an idea of the breadth of topic areas allowed. General themes may include (but are not restricted to) topics such as pathogen immunoevasion, host immune responses to infection, immunopathogenesis resulting from infection, vaccine development, or public health policy concerning vaccination. The student will submit to the course coordinators (see below for submission method) a 1/2 page proposal that provides an overview of the topic area plus PDF copies of 2-3 different primary research publications that describe current work being done in this area. You will not be tied to these specific publications – you can request a change in focus – these will simply be used to make sure you're on track and know what general area will be the topic focus to prevent overlap between presenters.

SELECTING A TOPIC:

Topics are not restricted to experiments at the laboratory bench; you may also consider clinical studies and/or studies that provide information for or against certain vaccine policies – follow your own interests. The publications selected for your topic focus must be primary research papers, NOT literature reviews or opinion pieces. However, the latter may be a good resource to help find a topic of interest to you, for background information, or for the selection of highly impactful publications in a particular area. For example, one option for selecting a topic might be to begin by searching PubMed (<http://www.ncbi.nlm.nih.gov/sites/entrez/>) with “Review” and then keywords of interest to you, either disease-focused (e.g. syphilis, cancer, addiction), immune effector focused (e.g. neutrophil, NK cell, C5a) and/or describing technical or thematic aspects (e.g. immune evasion, scRNAseq, knockout mouse, clinical trial). Then use this to focus in on a recent interesting paper. Alternatively, take some time to look through the table of contents of a higher impact research journal focused on the field of your choice, such as Nature Immunology, Nature Microbiology, Immunity, PLOS Pathogens, Cell Host & Microbe, mBio or the Journal of Experimental Medicine (you will have access to each of these through the U of T library) to find an article on a topic that interests you. A listing of journals in various fields and the journals' relative impact within that field can be found using InCites Journal Citation Reports (<http://admin-apps.webofknowledge.com.myaccess.library.utoronto.ca/JCR/JCR> ; this is a service subscribed to by U of T, so you may need to be on campus or logged on to the library to access this). For example, “Select Categories” on the left (for example, select Group “Biology and Biochemistry” and then either “Microbiology” or “Virology”, or select Group “Clinical Medicine” and then select “Immunology” or “Infectious Disease”) and then sort by journal impact factor (JIF). This will give an indication of what journals tend to publish the most impactful work.

If you have difficulty in selecting a topic and/or understanding a concept, you may make an appointment with our MIJ485 T.A. to discuss. Please do not leave this until just prior to the deadline to submit topics in case you are unable to schedule an appointment!

Once your topic proposal is ready, please forward it to our MIJ485 T.A. for comments and approval. See the Course Program for the deadline to submit.

NOTE: For all Email correspondence in this course, please begin the subject line with “MIJ485” so that we can recognize your note as a priority.

The order of student presentations will be selected at random – *they will not be tied to the course lecture schedule, so do not try to ‘target’ your seminar to a particular date.*

Each student’s PowerPoint presentation will be converted to a PDF and then made available on the course web site. You are responsible for understanding the material included within the student presentations for the exams.

**** (BIG HINT: Ask questions of the presenter if something is not clear!!) ****

GUIDELINES:

An important component of any research or development plan is its ability to convince the audience, whether it be a grant panel or a ‘venture capital’ company who may want to invest in the project, why it is important to perform the work. The impact of medical research may, for example, depend on both (i) the prevalence and/or severity of the disease or condition that is the focus of the work and (ii) the significant advancement in understanding and/or development of new interventions that will be made if the research is successful.

Once you have selected a topic, your goal is to determine what is an important next step. This may be further research to answer an important question that remains to be answered before a new medical intervention can be reasonably developed or administered, or may be translational work to demonstrate the utility of a new approach to prevent the development or progression of disease. It may be helpful to find another study that is related to but distinct from the study you are proposing to help provide a reasonable framework for your proposed work.

The student presentations and research proposal will provide an opportunity to present: (i) major (relevant) points of the published scientific literature that provides the foundation for the new studies, (ii) proposed studies to extend this and provide new insight and/or a development extending from recent findings, and (iii) future perspectives to clarify the impact that it will have on public (or animal) health.

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STUDENT PRESENTATIONS:

Student presentations will provide an opportunity to engage your audience with key background to set the stage for your planned studies, including general background to introduce the area

and the new insight gained by the study that you have selected as the basis for your work. Then, introduce your rationale and aims, outline your research plan, and put into perspective what advancement you expect to make and why this is important. **The presentation must be a maximum of 12 minutes and will be followed by a maximum 5 minute question period.**

Be selective of what you present – you will not have sufficient time to discuss every figure in the paper(s) that you are discussing, so discuss 2-3 of central importance for your work. When presenting data, make sure to present the rationale for an experiment, the methodology/approach, take the audience through the results (including controls) and then clearly define what we can conclude from these results (or what questions it raises). Similarly, the background that you present should be sufficient to set up the study but be focused so that you have sufficient time to discuss your plan. Presentations should be done using PowerPoint, although the coordinators will consider requests to use other suitable software. The grading scheme will be:

Seminar grading scheme (15%):

Presentation Style (clarity in speaking and clearly presented slides, do not simply read text from slides, use bullets to prompt yourself, try to discuss the slides rather than reciting a script, make eye contact with the audience, within time limit) - **3 points**

Introduction (appropriate to introduce audience to the area and set up research/development plan that will follow) - **3 points**

Data presentation (appropriate format, well understood, communicated in a manner that clarifies experimental rationale, strategy and discusses both the experimental results and its implications) - **5 points**

Research/Development Plan (what should be done next? how will this advance the field? outline the approach) – **2 points**

Questions (listen carefully to questions and respond clearly and directly to the best of abilities in a respectful manner, if you don't know the answer then say so, but if appropriate then suggest a possible explanation) - **2 points**

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RESEARCH PROPOSAL:

Prepare a formal research or development proposal outlining a project aimed at making a key advance in the field that you have selected and/or testing the feasibility of a new public health intervention based upon the published work.

A font of 12 point should be used, with margins of 1" around the page, and a maximum of 6 double-spaced pages (not including references and figures).

AI-generated text is not acceptable. Students will be required to submit their course essays to the University's plagiarism detection tool for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the tool's reference database, where they will be used solely for the purpose of

detecting plagiarism. The terms that apply to the University's use of this tool are described on the Centre for Teaching Support & Innovation web site (<https://uoft.me/pdt-faq>).

The proposal must include (number of pages listed are guidelines only):

Background information (~1 page) – Describe the current state of knowledge relevant to the studies that you will be proposing. This must set the stage for the subsequent sections.

Hypothesis (1-3 sentences) – Clearly state the hypothesis that you will test by the studies described in the research proposal. Make sure that it is a *testable* hypothesis, and that it will be addressed by the research or development plan outlined in your proposal. Take sides - your hypothesis suggests how something might work; the research outlined below must aim to support or refute it. *The goal is not to correctly guess the way in which something works, it is rather to develop a model that can be experimentally tested.* The research project will be successful if it definitively proves the hypothesis correct or incorrect, it will be unsuccessful if the outcome is not decisive either way; the latter outcome may occur if the hypothesis was not testable and/or because the experimental plan is not sufficiently focused to test the hypothesis. The hypothesis is typically stated in one sentence. However, you can include in this section an introductory sentence to set it up (making the point why the specific question is important) and/or a concluding sentence to state its importance. **An example of a grant hypothesis and specific objectives (extracted from a full grant) is appended below.**

Specific objective(s) (2-3 sentences) – Clearly define the specific aim(s) of your research, with the ultimate goal of determining whether your hypothesis is true or false. You may have more than one objective if you are approaching your hypothesis from different directions. State each objective in a single sentence that indicates the aim and gives brief indication what approach(es) will be used (see example below).

Research plan – Describe the experiments that you will actually perform. Use a narrative style that sets up the question that needs to be asked (why is this set of experiments important?) and an overview of the general approach. Present the research in logical order, with distinct approaches/lines of research separated into sections with clear subheadings (*i.e.* Subheadings within the Research Plan section may include: *Rationale for Work, Experimental (or Developmental) Strategy, Experimental (or Developmental) Plan*). There must be enough detail that the referee can be confident that you can do the research and have a good understanding of the strengths and weakness of this approach/technology to be used; but it **should not be a step-by-step protocol**. Be careful to justify why you are doing each experiment described, what the possible outcomes are, and what these would mean with respect to your understanding of the system and/or future plans. Be careful to select steps that are going to be helpful – it is not useful to do experiments that will not provide information helpful to test your hypothesis or developmental goals. It is important to highlight weaknesses in the approach and/or other potential challenges, and to suggest an alternative experimental approach should your first approach fail. You require less detail regarding the alternative than you do about the primary approach, but it should be clear what your alternative is, why it might overcome any hurdles (it must be different enough that it will not have the same potential problems) and it is very helpful to reference a publication that describes how a similar approach was useful for some related purpose. **For example:** "... Success in this approach requires that we are able to recover sufficient bacteria from the infected tissues. While this is preferable because it assures

that they will be unchanged from their phenotype expressed within the tissues, the amount of RNA obtained may be insufficient for RNA sequencing. In this case, we will sub-culture the bacteria a single time on plates and then recover the resulting bacterial colonies for RNAseq analysis. This latter approach was previously used by Radar et al. (27) to demonstrate that the *orpC* gene is upregulated *in vivo*.”

Future perspectives (~1/2 page) – This section gives a brief but firm comment describing where you expect to be at the end of the study, and should provide a vision for where you would proceed from there (research and/or translation of findings to new vaccine, therapy, etc). This is one last chance to summarize your plan and excite the reviewer regarding its importance.

References (The reference list is NOT included in the page limit) – The primary source of any information that you write about must be referenced. The reference list should include the full author list and full title of article or other material (the *Journal of Immunology* format would be a good example for referencing format). Note that **referencing an information source does not mean that you can copy word for word, nor does it mean that you can use a sentence with only a few words changed**. The text in any document must be in your own words, meaning that you must understand the information, and then write it so that it summarizes or otherwise contains only the relevant details and puts it in the context of your proposal (which will undoubtedly be in a different context and have a different sentence structure and purpose from that in the original referenced source). **Plagiarism will not be tolerated**. If a particular quote is worth copying word for word, then it must be placed in quotation marks and the details of where you found the quote must then follow the quote or be placed in a footnote (not simply placed in the reference list!).

The grading scheme that will be used for your research proposal and some suggestions for preparing a grant proposal are as follows:

Research Proposal grading scheme (20%):

Introduction (appropriate background to understand key points and to justify research) – **3 points**

Hypothesis (creative, testable and appropriate) – **2 points**

Specific Aims (these should test the hypothesis) – **2 points**

Research Plan – note that this is not a detailed step-by-step protocol, it should use narrative style to clarify what you’re doing and why you’re doing it this way (this should be a logical extension of aims, reasonable and appropriate description of research strategy with a concise presentation of important experimental details, with potential pitfalls and alternative approaches considered) – **8 points**

Future Perspectives (indicates advances that will be achieved & future potential) – **2 points**

Overarching Impact of the Work (research plan as a whole represents a clear and significant advance to the field) – **3 points**

