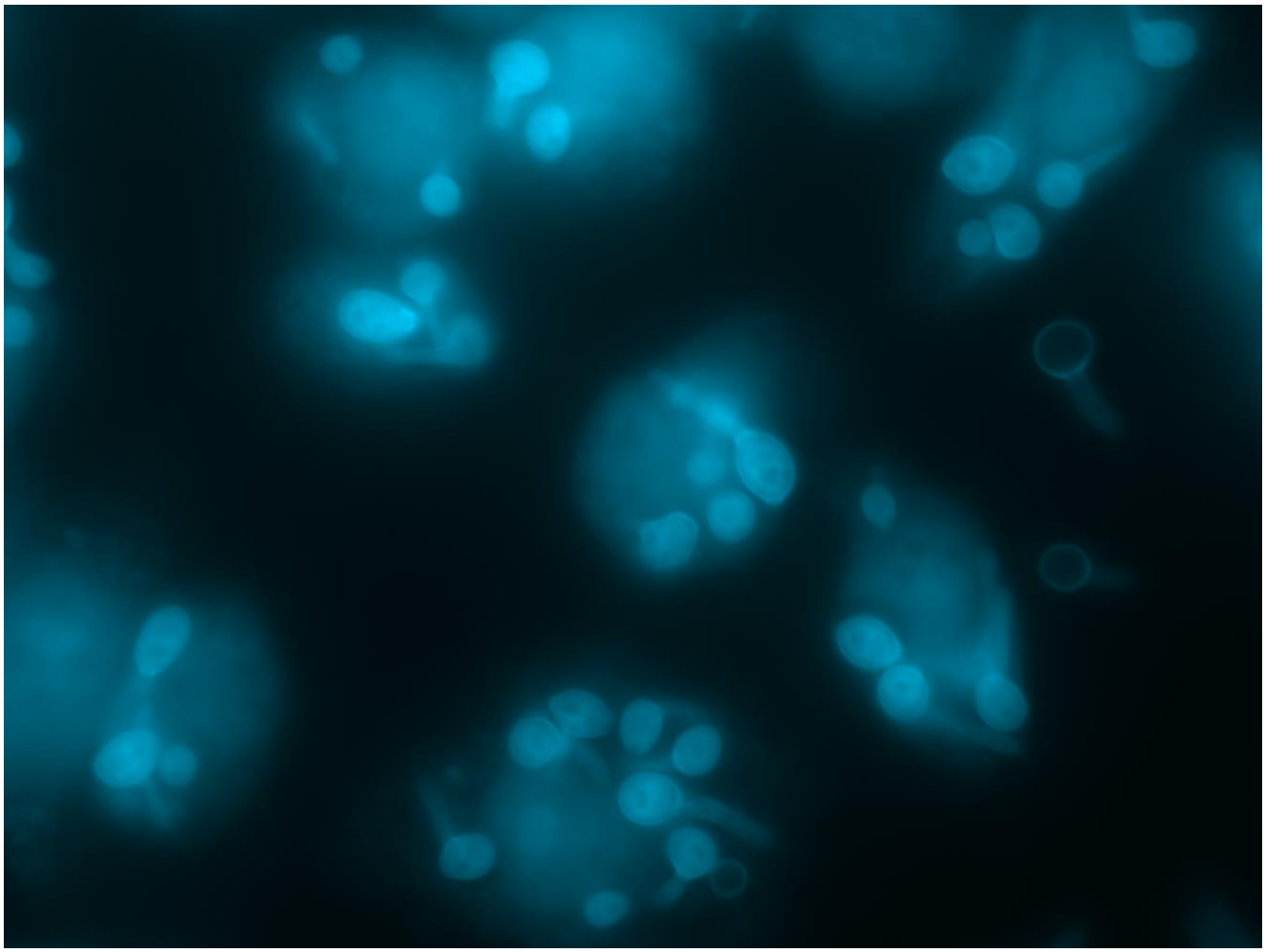
MGY277H1

Introduction to Medical Microbiology

2022 SYLLABUS



Immune cells known as macrophages engulf cells of the human fungal pathogen *Candida albicans*
photo courtesy of Teresa O'Meara

Molecular Genetics
UNIVERSITY OF TORONTO

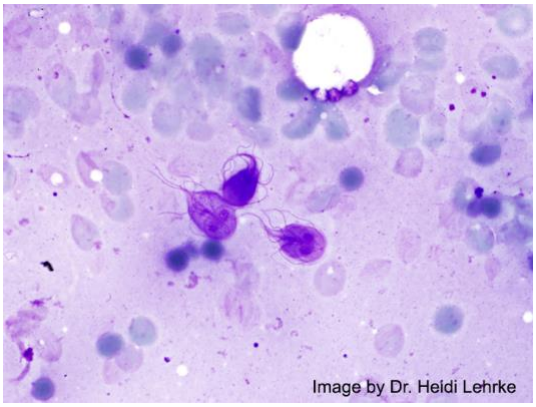
Welcome to MGY277!

We are thrilled you are joining us! In the time of COVID-19, this course is especially important.

In this course we are going to explore one of the most important subjects in all of medical science - communicable diseases. This course was designed to meet the needs of second-year students interested in infectious disease and upper-year students who are interested in a basic microbiology class with a medical perspective, perhaps to meet the prerequisites for a professional program in health sciences.

We will cover the basics: what microbes are and explain the differences between parasites, fungi, bacteria, and viruses. We will discuss how to cultivate microbes, and how they are identified in the lab. Importantly, we will spend a lot of time discussing microbes of medical relevance including how they cause disease and how they are diagnosed and treated.

The understanding that microbes are the cause of disease was a revolution every bit as important to our life as the industrial revolution. Since 1900 we have added 30 years to our average life span, most of this is because of vaccines, wide-spread access to clean drinking water, better hygiene and food preparation practices, antibiotics, and the emergence of public health agencies at all levels of government.



Giardia duodenalis is one of the most common human parasitic infections. They attach to the human intestinal wall with a large sucking disk and move using 4 pairs of flagella. Infections from *Giardia* can be acquired by drinking contaminated water, such as untreated lake and river water.

Many challenges remain, however. One challenge is that new infectious diseases emerge every few years, such as our current COVID-19 pandemic. Around 1980 we saw the emergence of a new and terrifying virus, HIV, that now infects millions of people on every continent. We have also seen antibiotics that were effective against many bacterial or fungal infections become useless as these microbes evolve resistance to almost every available treatment.

Another challenge is the difference in health outcomes between well-resourced and less well-resourced settings. While we have seen the number of deaths due to infectious diseases plummet in high- and middle-income countries, in low-income countries the people still predominantly die of infectious diseases. This does not tell the whole story, however: in Canada, Indigenous populations are subject to much greater infectious disease burdens than non-Indigenous Canadians, highlighting the health disparities that exist even within our well-resourced nation.

This course is always a work in progress but we will do everything in our power to clearly state our expectations and maintain open lines of communication.

Looking forward to an exciting semester!

Jessica Hill, PhD

PREREQUISITES

To succeed in MGY277, you will need a basic understanding of the cell (What is DNA? What is a cell? What do proteins do?) and some basic biochemistry and genetics (What is PCR and how does it work?).

If you find you need a refresher on basic biochemistry please look over Chapter 2 of the recommended textbook – we will not be covering it because we assume you already have a basic understanding of the most important concepts.

CONSIDERATIONS FOR TAKING AN ONLINE COURSE

In this online course, there is no scheduled lecture time. Over the course of each week, you are expected to watch the videos and do the readings assigned. However, there are deadlines for the Weekly Quizzes and Assignments. We suggest that, like with a live course, you make sure to schedule the time in your calendar to watch the videos, do the readings assigned and complete the Weekly Quizzes and Assignments! Before we go further, check out this link: Is Online Learning Right for Me?

COURSE ORGANIZATION

MGY277 is organized into 11 "Units". Each Unit consists of roughly one week's worth of material. Some units may be longer than others and require more time.

A new Unit is released nearly every week of the course. You can find out when a new unit is being released by consulting the Course Calendar. You can access Units from the course homepage.

Each Unit is composed of 5 main parts:

1. Videos,
2. Recommended readings
3. Unit Quiz
4. Assignment (3 times throughout the term)
5. Concept maps

Here's a little more detail about each.

Videos: The videos are the core of each Unit and mostly feature lectures from one of our course instructors.

Recommended readings: The readings are typically assigned from the textbook or supplementary material. Unless otherwise stated, textbook readings are meant to support your understanding of lecture material and will not be tested explicitly.

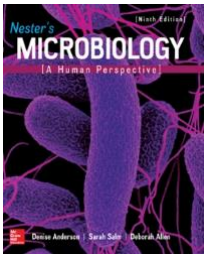
Unit Quiz: Each week of the course has an associated Unit Quiz, an open book quiz that you are expected to complete within a certain time frame (several days; please check the course Calendar to find release and due dates for quizzes). Unit Quizzes typically consist of multiple-choice type questions. Your Unit Quiz mark will be calculated by averaging **all** Unit Quiz marks.

Assignment: Some weeks, there will be an Assignment due. The Assignments are meant to reinforce your knowledge of course material and often present opportunities to apply the course material to real life scenarios. There will be three Assignments over the course of the term. The release and due

dates for Assignments can be found on the MGY277 Calendar. Your Assignments mark will be calculated by averaging **all** Assignments.

Concept Maps: For each Unit of the course, you will be asked to submit a concept map, which is a visual tool for depicting relationships between different pieces of information. The concept map you submit will be marked for its contribution only (ie. We are not evaluating them), but I encourage you to put effort into creating them, as evidence suggests that they are an excellent study tool. More details about concept mapping can be found on Quercus.

COURSE TEXTBOOK



The textbook for this course is "Microbiology: A Human Perspective" (publisher: McGraw Hill). There are a limited number of copies of the 7th and 8th editions and newer 10th edition (pictured) on reserve at the Gerstein library. It is also available through the University of Toronto Bookstore.

The textbook is **recommended** for the course: it can help reinforce course material. Your Exam questions, however, will be based on material from course videos.

COURSE MARKING SCHEME

Final Exam – 37%

Unit Quizzes – 22%

Assignments – 30% (3 x 10% each)

Concept Maps – 11%

Note that the Final Exam for MGY277 will be held in person on the St. George campus, to be scheduled during the final exam period.

UNIT SCHEDULE

UNIT	TOPIC	SUPPORT
1	Perspectives on Microbiology and Infectious Disease	Jessica Hill
2	Bacteria	Jordan Lin
3	Viruses	Beata Cohan
4	Eukaryotic Microbes	Amin Yarmand
5	Control of Microbial Growth	Beata Cohan
6	Microbial Classification and Identification	Amin Yarmand
7	Antimicrobial Drugs and Antimicrobial Resistance	Jordan Lin
8	Epidemiology and Disease Transmission	Beata Cohan
9	Immunity and Vaccines	Amin Yarmand
10	Principles of Pathogenesis	Jordan Lin
11	Microbiota	Jessica Hill

IMPORTANT DATES IN THE COURSE

The release dates and due dates for all Unit Quizzes, Concept Maps and Assignments have been added to the MGY277 Calendar. Please check the Calendar for the most recent updates of course due dates.

All Unit Quizzes, Assignments and Concept Maps will be due at 11:59pm

Note that the correct answers for Unit Quizzes will be released one week after the due date.

COURSE COMMUNICATION — HOW TO GET HELP

Have a question? Chances are you're not the only one. We like to hear from you and would like to help set you up for success early on if issues arise.

FOR QUESTIONS REGARDING COURSE MATERIAL:

We would like to have open lines of communication, so we will answer questions related to course content on the "Discussion Board" for each module Quercus. All course material related questions should be directed to the Discussion Board.

The Discussion Board is meant to be a positive space where students should feel comfortable asking questions that they have taken the time to consider independently, and for other students to provide feedback. Each forum will be monitored by a TA and/or the course coordinator, who can helpfully and respectfully clear up any misconceptions that may arise.

Each unit of the course will have its own forum. Before posting a question, please read the other posts in that forum because your question may have already been asked.

FOR QUESTIONS OR HELP ON OTHER ISSUES:

(eg**.** sick, family issues, prerequisites, etc.)

Please contact your designated contact below:

Last name beginning with:	Contact the following:
A — Jan	Amin Yarmand amin.yarmand@mail.utoronto.ca
Jam — Paq	Beata Cohan beata.cohan@mail.utoronto.ca
Par — Z	Jordan Lin jordand.lin@mail.utoronto.ca

Your TA or the course coordinator will respond to you within **24 hours (excluding weekends)** to let you know your message has been received. However, unless the need is truly urgent, your matter will not be discussed and a decision will not be reached until our weekly TA meeting.

WHEN WE WANT TO CONTACT YOU:

At times, we may decide to send out important course information by email. To that end, all students are required to have a valid University of Toronto email address. You are responsible for ensuring that your University of Toronto email address is set up and properly entered in the ROSI system.

Particularly when we want to disseminate information to the entire class, we make a course Announcement. Course Announcements will be retained at the Announcements link.

It is critical that you read/watch the videos for Course Announcements in a timely manner.

COURSE POLICIES

LATE SUBMISSIONS:

In this course, Unit Quizzes and Assignments are due at the dates and times specified on the course Calendar. Please ensure that you submit your Unit Quizzes and Assignments correctly. If you are unable to make the submission deadline for a Unit Quiz or Assignment, please let your TA know prior to the deadline, if possible, so that accommodations may be made, as determined on a case-by-case basis.

Barring exceptional circumstances, late submissions of Unit Quizzes without prior notification will receive a mark of 0. Assignments submitted late lose 50% the first day, and a mark of 0 afterwards.

MARKING POLICY:

If we have given incorrect information, we will make an Announcement to the entire class at once about what the issue was and how we will resolve it.

TECHNOLOGY REQUIREMENTS:

You must have access to a computer or a tablet with a Wi-Fi internet connection (or faster) to be able to watch the videos.

This course requires the use of computers, and of course sometimes things can go wrong when using them. You are responsible for ensuring that you maintain regular backup copies of your files, use antivirus software (if using your own computer), and schedule enough time when completing an assignment to allow for delays due to technical difficulties. Computer viruses, crashed hard drives, spotty Wi-Fi signals, broken printers, lost or corrupted files, incompatible file formats, and similar mishaps are common issues when using technology, and are not acceptable grounds for a deadline extension or late submissions.

INSTITUTIONAL POLICIES AND SUPPORT

POLICY ON DISTRIBUTION OF THE MATERIALS OUTSIDE OF THE COURSE:

At the University of Toronto and the Department of Molecular Genetics we take pride in the fact that we have unique, high-level and up-to-date expertise in the course topics. All course materials are the Intellectual Property of the lecturers. Further distribution of the lecture materials without permission constitutes an academic offence, and the instructors have the right to pursue disciplinary action.

ACADEMIC INTEGRITY:

Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensuring that a degree from the University of Toronto is a strong signal of each student's individual academic achievement. As a result, the University treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behaviour on Academic Matters (www.governingcouncil.utoronto.ca/policies/behaveac.htm) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences. Potential offences include, but are not limited to:

In papers and assignments:

1. Using someone else's ideas or words without appropriate acknowledgement.
2. Submitting your own work in more than one course without the permission of the instructor.
3. Making up sources or facts.
4. Obtaining or providing unauthorized assistance on any assignment.

On tests and exams:

1. Using or possessing unauthorized aids.
2. Looking at someone else's answers during an exam or test.
3. Misrepresenting your identity.

In academic work:

1. Falsifying institutional documents or grades.
2. Falsifying or altering any documentation required by the University.

All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters. If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, you are expected to seek out additional information on academic integrity from your instructor or from other institutional resources (see www.utoronto.ca/academicintegrity/resourcesforstudents.html).

ON ACCOMMODATION FOR STUDENTS WITH DISABILITIES:

The University provides academic accommodations for students with disabilities in accordance with the terms of the Ontario Human Rights Code. This occurs through a collaborative process that acknowledges a collective obligation to develop an accessible learning environment that both meets the needs of students and preserves the essential academic requirements of the University's courses and programs.

Students with diverse learning styles and needs are welcome in this course. If you have a disability that may require accommodations, please feel free to approach me and/or the Accessibility Services office.

ON ACCOMMODATION FOR RELIGIOUS OBSERVANCES:

The University provides reasonable accommodation of the needs of students who observe religious holy days other than those already accommodated by ordinary scheduling and statutory holidays. Students have a responsibility to alert members of the teaching staff in a timely fashion to upcoming religious observances and anticipated absences and the MGY277 teaching team will make every reasonable effort to avoid scheduling compulsory activities at these times.

Please reach out to your TA as early as possible to communicate any anticipated delays in work submission related to religious observances, and to discuss any possible related implications for course work.

ON ACCOMMODATION FOR FAMILY CARE RESPONSIBILITIES:

The University of Toronto strives to provide a family-friendly environment. You may wish to inform me or your TA if you are a student with family responsibilities. If you are a student parent or have family responsibilities, you also may wish to visit the Family Care Office website at familycare.utoronto.ca.

PROMOTING EQUITY, DIVERSITY AND INCLUSION:

The University of Toronto is committed to equity, human rights and respect for diversity. All members of the learning environment in this course should strive to create an atmosphere of mutual respect where all members of our community can express themselves, engage with each other, and respect one another's differences. U of T does not condone discrimination or harassment against any persons or communities.

SERVICES AND SUPPORT:

The following are some important links to help you with academic and/or technical service and support

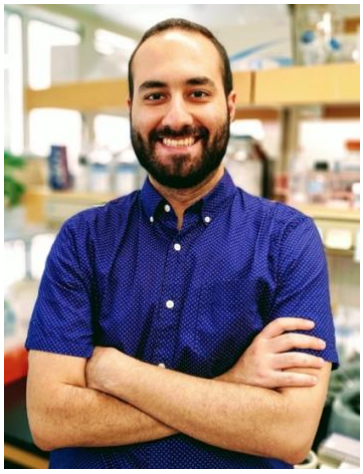
- General student services and resources at Student Life
- Full library service through University of Toronto Libraries
- Resources on conducting online research through University Libraries Research
- Resources on academic support from the Academic Success Centre
- Learner support at the Writing Centre
- Information about Accessibility Services
- What to know if you are taking the course from outside the GTA
- Recommended technology requirements for online learning

MGY277 TEACHING TEAM

Jessica Hill, Ph.D., Course coordinator

I completed my undergraduate studies at Queen's University and an MSc at the University of British Columbia with Sally Otto. I received her PhD from the University of Toronto in 2014, having studied the evolution of drug resistance in the fungal pathogen *Candida albicans* with Leah Cowen. I then pursued post-doctoral research with Helen Dimaras at SickKids, studying clinical cancer genetics in global health then rejoining the Department of Molecular Genetics as an Assistant Professor, Teaching Stream. When not thinking about science and undergraduate education, I can often be found playing with my toddler or on my Peloton.

Contact: Jessica.hill@utoronto.ca



Amin Yarmand, Teaching Assistant

Hello everyone! My name is Amin Yarmand and I have the pleasure of being your teaching assistant this semester. I am a fifth-year student in the lab of Dr. Jeff Wrana in the Lunenfeld-Tanenbaum Research Institute at Mt. Sinai hospital. I study the development of the immune system in the cerebral cortex. For this, I am working on establishing a novel human model by integrating stem cell derived cerebral organoids and hematopoietic progenitors. Before joining U of T, I received a BSc with a major in Microbiology and Immunology and a minor in Philosophy from UBC in Vancouver. In my spare time, I enjoy playing the piano, cooking, and binging Netflix! I look forward to assisting your learning experience during these unusual times.

Contact: amin.yarmand@mail.utoronto.ca

Beata Cohan, Teaching Assistant

Hello! I am a fourth year PhD student in the lab of Dr. Lori Frappier. Our lab studies the human herpesvirus Epstein-Barr virus (EBV), which you may recognize as the virus that causes infectious mononucleosis. EBV is ubiqitous, estimated to infect around 90% of the human population, and is also causally associated with several cancers. Like other herpesviruses, EBV cycles between both latent and lytic forms of infection, which allows it to generate a life-long infection within its host. I study how the interactions between an EBV lytic protein and a cellular chromatin remodeller may be altering the transcription of cellular genes during infection. I received my BSc from UofT Mississauga, where I worked with Dr. Marc Johnson studying urban evolutionary ecology. In my free time I enjoy painting, cycling, volleyball, and botany through growing tropical plants at home.

Contact beata.cohan@mail.utoronto.ca

Jordan Lin, Teaching Assistant

I am a PhD student in Dr. Alex Ensminger's lab. Our lab studies the pathogenic bacterium *Legionella pneumophila*, which infects and replicates intracellularly within a variety of amoebal species and human lung macrophages. This bacterium is a model for the study of molecular pathogenesis, which examines the molecular machinery that pathogens utilize to manipulate and modify the host environment for their benefit. We study these pathogenic weapons, in addition to other elements of *Legionella* biology, such as its CRIPSR systems and cryptic stress circuits. I received a BSc and BA from the University of British Columbia, and outside of the lab I enjoy hiking, climbing, canoeing, and other outdoor activities.

Contact: jordand.lin@mail.utoronto.ca