

MMG1322H S - Molecular Genetics Graduate Topic Course

Course Title: Protozoan Pathogens

Course Location: Mars, 16th floor, 1622 (except for Feb 13th, which will be Mars, 15th floor, 1522)

Course Time and Date: Mondays 10am-12pm (Feb. 2 – March 9, 2026) (except no class on Feb. 16, which will be held instead on Friday Feb. 13 10am-12pm).

Course Instructor: Aaron W. Reinke, Ph. D.

Instructor Contact Information (email): aaron.reinke@utoronto.ca

Course Overview:

Protozoans comprise a large and diverse group of eukaryotic microbes. There are dozens of protists that infect humans, which together kill over a million people every year. Protozoan parasites that infect humans include apicomplexans, kintoplastids, amoebas, and giardia. There are few treatments for these pathogens and there is still much to understand about how these protists infect hosts and cause disease. Papers selected for discussion will focus on recent advances in protozoan evolution, invasion and virulence mechanisms, and development of therapeutics. There will be a specific emphasis placed on new technologies that are driving discoveries in these challenging organisms. Student grades will be based on written assignments, presentations, and participation in discussions.

Course Objectives:

- Provide an overview of the diversity of protozoa that cause disease in humans
- Learn about protozoan pathogen evolution
- Understand how protozoa infect cells and invade host immunity
- Explore protozoan virulence mechanisms
- Survey the unique metabolism of protozoans and their reliance on their hosts
- Examine approaches to develop therapeutics for protozoan pathogens

Marking Scheme:

- 25% for background presentations. Each class there will be ~15 minute presentations on the background for the articles that week. These presentations will include background on the specific parasites that will be discussed that week as well techniques that were used in the assigned articles.
- 20% for participation in discussion of journal articles. This includes presenting specific figures and contributing to the discussion in general.
- 30% for written ~ 2 paragraph summary reviews on the assigned research articles.

- 25% for presentations during the last class. These presentations will describe experiments extending the work from one of the papers discussed in the course.

If you anticipate missing a class you must let the instructor know in advance, given the weight on participation and the fact that there are only six classes. Providing that you had a legitimate reason for missing the class, you will be provided with an assignment based on the reading for that week that you can use to make up for the lost class.

The basic outline for what will be covered in the six weeks is below. Assigned reading will be sent out the week in advance. In addition to the research articles, a review article will be distributed that is meant to provide a bit of context for the lecture for those students with less background and will not be a specific point of discussion.

Week 1: Evolution of protozoan parasites (February 2)

Week 2: Infection and invasion mechanisms (February 9)

Week 3: Host responses to infection and pathogen immune invasion mechanisms (Feb 13)

Week 4: Parasite virulence factors and effects on the host (Feb 23)

Week 5: Development of therapeutics (March 2)

Week 6: Novel metabolic pathways and reliance on host nutrients (March 9)