

Molecular Genetics Graduate Topic Course

Course Title: Virus-Host Interactions

Course Location: to be determined

Course Time and Date: Fridays 2-4 PM, October 18 – November 22, 2024

Course Instructor(s): Martha Brown

Instructor Contact Information (email): martha.brown@utoronto.ca

Additional Lecturers (list name, email, Department): none

Course Overview:

This course will consider new developments in understanding the different ways in which viruses can spread from one infected cell to a new target cell. This version of the course is for students who already have a background in virology (eg an undergrad or grad course). The first class will comprise an interactive review of virus replication with particular attention to release of progeny virions and entry into the next host cell. Subsequent classes will consist of student presentations of selected papers from the literature, along with class discussion. Papers for presentation will be distributed a week in advance of the presentation. Assessment is based on presentation of one or more papers (depending on class size), participation in class discussion and a written assignment.

This version of the course will focus on an aspect of virology that currently is attracting a lot of interest, specifically, the release of non-enveloped viruses. In contrast to what the textbooks say, it's not just that viruses get out when the host cells disintegrate but there is now substantial evidence that several non-enveloped viruses are released in vesicles before the cell disintegrates. Not only do vesicles deliver progeny viruses to new target cells but they also deliver molecules that can modulate conditions within the target cells, resulting in an intracellular environment that is more, or less, conducive to virus replication. Vesicles, however, are not the only mechanism by which progeny virions can be delivered to new target cells. Cell-cell junctions can be disrupted or nanotubes, that connect cells over considerable distance, can be used. These modes of virus spread will be considered as well.

Course Objectives:

- To explore the recent literature that draws attention to vesicles for transport of newly-made virions between cells within one host and even between hosts
- To consider the role of vesicles for communication between infected cells and their uninfected neighbours
- To explore other mechanisms for transport of progeny virions from one infected cell to the next host cell

Marking Scheme:

- Presentation 30 %
- Participation/discussion 20%
- Take-home exam 50%
(questions distributed in last class; papers due two weeks later)

If you anticipate missing a class you must let the instructor know in advance. You will still be responsible for the material covered in that class.

The basic outline for what will be covered in the six weeks is below:

- Week 1: Overview of poliovirus replication and early studies in release (October 18)
- Week 2: Release of rota- and noroviruses; transmission of virus between hosts (October 25)
- Week 3: Vesicles for cell-cell communication (November 1)
- Week 4: Influence of infected cells on nearby cells (November 8)
- Week 5: Measles virus spread (November 15)
- Week 6: Virus transport between cells by tunnelling nanotubes (November 22)