Syllabus for Math 4755 (Spring 2019)
Mathematical Biology: Virus Dynamics, 3 Credits
TTh, 4:30-5:45, Skiles 246

Instructor

Dr. Howard (Howie) Weiss
Professor of Mathematics
weiss@gatech.edu
Office Hours: M 11-12, W 2-3, or by appointment

1 General Information

Course Description

Viruses are the most abundant organisms on earth. They also cause many diseases in plants, animals, and humans around the world. In this course we will take a mathematical tour of virus dynamics. Guided by simple mathematical models, mostly systems of ordinary differential equations, we will explore the population and evolutionary dynamics of in-host viral infections and transmission between hosts.

Pre- and/or Co-Requisites

Prerequisite: Math 2552 (a first course in ordinary differential equations) or equivalent or permission of the Instructor. There is no biology prerequisite.

Learning Objectives

1. Learn basic virus biology and host immune defenses against viruses
2. Learn elements of mathematical modeling using (mostly) ordinary differential equations, including both quantitative and numerical model analysis
3. Learn to analyze the basic in-host virus population model along with extensions to account for host immune defenses, anti-viral drug therapy, mutations, and emergence of drug resistance
4. Use these models to explore the population and evolutionary dynamics of Influenza, HIV, bacteriophages, and computer viruses
5. Learn how viruses are transmitted between hosts, and analyze basic transmission models with the goal of mitigating outbreaks
6. Become a more informed healthcare consumer

2 Course Requirements and Grading

Attendance and participation (10%), problem sets (50%), four or five quizzes (20%), and project (20%)  

Grading Scale

Your final grade will be assigned as a letter grade according to the following scale:
A 90-100%
B 80-89%
C 70-79%
D 60-69%
F 0-59%

3 Course Materials

Course Texts

Virus Dynamics by Novak and May
How Pathogenic Viruses Think by Sompayrac

Course Website


4 Course Expectations and Guidelines

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech’s Academic Honor Code, please visit http://www.policylibrary.gatech.edu/student-affairs/academic-honor-code.
Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

**Accommodations for Students with Disabilities**

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404) 894-2563 or http://disabilityservices.gatech.edu/, as soon as possible, to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

**Attendance and Participation**

It is essential that you try hard to attend all classes, but please do not attend class when sick. Ten percent of your grade will depend on attendance and class participation.

**Collaboration and Group Work**

You may discuss homework problems with other students, but you must independently write up and submit your own solutions. Copying any part of a solution from a book, solutions guide, or website is cheating!

**Extensions, Late Assignments, and Re-Scheduled/Missed Exams**

Late homework assignments will not be accepted without an official excuse from the Dean of Students or other university official. However, you may drop your lowest homework grade. Emailed homeworks will only be accepted with prior agreement of the Instructor. There will be no make-up quizzes for absences without an official excuse from the Dean of Students or other university official.

**Student-Faculty Expectations Agreement**

At Georgia Tech we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. See http://www.catalog.gatech.edu/rules/22/ for an articulation of some basic expectation that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial
interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

**Student Use of Mobile Devices in the Classroom**

You may use laptops or tablets in this class to take notes. Place your phone on mute before class begins. It is extremely disruptive when a cell phone rings during class. If you must, you may use your cell phone silently during class as long as it is hidden from view.