

Math 5110 (cross-listed with Math 6830)
Mathematical Biology
Fall Semester, 2017

Time: TH 9:10–10:30
Place: AEB 360
Instructor: Fred Adler
Offices: 304 LCB and 319 South Biology
Office Hour: Monday from 11:00 - 12:00 in LCB 304
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TA: Liz Fedak
Office: 318 LCB
Office Hours: Monday from 1:00 - 2:00 and Friday from 2:00 - 3:00
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Supp. texts: L. Edelstein-Keshet *Mathematical Models in Biology*
J. D. Murray *Mathematical Biology*

The Course: Math 5110 is designed to introduce the mathematically apt to some of the basic models and methods of mathematical biology. No previous knowledge of biology is necessary.

Expected Learning Outcomes: Translate a biological story into a mathematical model, understand the assumptions underlying a given discrete-time dynamical system or a system of differential equations, find equilibria and evaluate stability to predict long-term behavior of dynamical systems, use a computer to study dynamics.

Homework: Written homework will be handed out each Tuesday (and posted on the web page) and due at the beginning of class on the following Tuesday (after the first week). There will also be a computer component, based on the free language R. We'll give lots of instructions and links on how to get this essential modern applied math tool to work.

Part of class each Tuesday can be used to work out any homework problems that caused widespread confusion. Homework will be worth 40% of your grade. Feel free to consult other students, but only after thinking hard about the problems yourself. Hand in only your own work, of course.

Tests: There will be one midterm on October 5, worth 20% of your grade, and a comprehensive final on December 14 at 8:00 a.m., worth 40% of your grade.

Math 6830: Students signed up for this course number will write an additional research paper, about 5-10 pages, that extends one of the models studied in class, provides a more in-depth analysis, or develops a related model based on personal interest or another class.

COURSE OUTLINE
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Mathematical Biology
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Week of	Topic
Aug 21	Introduction to math biology
Aug 28	Linear discrete-time dynamical systems: Matrices
Sep 4	Nonlinear discrete-time dynamical systems
Sep 11	Two-dimensional nonlinear discrete-time dynamical systems
Sep 18	Models of parasitoids and hosts
Sep 25	Harvesting, game theory, evolution, or catching up
Oct 3	Review and midterm
Oct 16	The spruce budworm and the phase-line
Oct 23	The ecology of natural enemies
Oct 30	The ecology of competition
Nov 6	Birth-death processes
Nov 13	Kinetics
Nov 20	Molecular switches
Nov 27	Delay differential equations
Dec 4	Models of neurons

ADA statement: The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations.

Accommodations policy: The instructor does not grant content accommodation requests as the course content fulfills legitimate pedagogical goals.

Academic Misconduct: Academic misconduct includes, but is not limited to, cheating, misrepresenting one's work, inappropriately collaborating, plagiarism, and fabrication or falsification of information. It also includes facilitating academic misconduct by intentionally helping or attempting to help another to commit an act of academic misconduct. Any assignment or test associated with academic misconduct will receive no credit, and may lead to a failing grade and reporting to the higher administration.