

THE ROLE OF MATHEMATICS IN MEDICINE
Fall, 2015

Time: TH 12:25–1:45 p.m.
Place: LS 101
Instructor: Fred Adler
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Web page: <http://www.math.utah.edu/~adler/math3600/>
Text: No primary text
Supplementary texts:

F. R. Adler, *Modeling the Dynamics of Life, Third Edition*
S. Otto and T. Day, *A Biologists Guide to Mathematical Modeling*
D. Rosen, *Mathematics Recovered for the Natural and Medical Sciences*

The Course: This course will develop detailed case studies where mathematics has played a fundamental role in improving medical care. Each week will begin with the medical and biological background, showing both the underlying physiology and the medical problem, then move on to how mathematical or quantitative methods changed practice. We'll develop the underlying mathematical methods from the ground up, program simulations on the computer, and use the mathematics and computer simulations to evaluate the medical implications of different therapies or control measures.

Classes: Class on Tuesdays will combine lecture and discussion to present the biological, medical and mathematical background, and on Thursdays we will work together to apply mathematical methods to the problem.

Reading: We will read one or two articles from the primary literature, posted at a secret location on the course web site, each week. It is essential to read all of the material **before** class on Tuesday.

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

Classroom etiquette: Students will maintain a respectful and safe learning atmosphere, and class will be canceled if this atmosphere is violated.

Deliverables: Grades will be determined by performance on the following six elements.

1. Homework (most weeks), due on Tuesdays (25%).
2. Leading one discussion of a reading (15%) during class on Tuesday of that week. Be prepared with some questions, whether or not you know the answers, that will help focus the discussion and guide our investigation of the underlying issues.
3. Five one page essays to be done individually based on the readings (15%). These should summarize the main question and results of the paper, and reflect on a particular strength, weakness, application or other extension of the article. These are due Tuesday of the week that reading is covered, in the weeks of Sept 1, Sept 15, Oct 6, Oct 27 and Nov 17 . If there are two Main readings, either focus on one of your choice, or on a comparison between them.
4. A journal reflecting on and integrating the topics from each week, to be checked by the instructor every few weeks (15%). There is no specific format or content, just your way of engaging with the course material, or things in your life that are related to issues that come up in class. Hand in journals on Sep 8, Sep 29, Oct 20, Nov 10 and Dec 8.
5. Participation in discussions and other class activities (10%).
6. One investigation of a topic that extends the original problem, due and presented at the end of the semester (20%).

Additional requirements: Students enrolled in Biol 5400 level will complete an additional individual paper, of roughly 5 pages, investigating a topic not covered in the course based on reading of the primary literature (with guidance from the instructors).

Prerequisites: Mathematics up through precalculus, one year of Biology at the 2000 level or the equivalent (such as Cell Biology and Genetics). The ideal class will combine students with much more mathematical background and others with much more medical background.

ADA policy: 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 this class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union, 1-6020. CDS will work with you and the instructor to make arrangements for accommodations.