BIOLOGY 5910
MATHEMATICAL MODELING IN BIOLOGY
Fall Semester, 2013 Tentative Syllabus

Time and Place: Tuesday and Thursdays 12:25–1:45, LS 102
Instructor: Fred Adler
Offices: 304 LCB and 319 South Biology
Office Hour: 11:00 - 12:00 W (SB 319)
email: adler@math.utah.edu
TA: Andrew Basinski
Office Hours: 4:00 - 5:00 on Tuesday in JTB 110
                 4:00 - 5:00 on Friday in LCB 323
email: abasi684@gmail.com
Web: `http://www.math.utah.edu/~adler/bio5910/`
Optional text: F. R. Adler, *Modeling the Dynamics of Life*
Supplementary texts:
                 E. S. Allman and J. A. Rhodes, *Mathematical Models in Biology*
                 L. Edelstein-Keshet *Mathematical Models in Biology*
                 S. P. Otto and T. Day, *A Biologist's Guide to Mathematical Modeling*
                 G. Ledder, *Differential Equations, A Modeling Approach*

The Course. Biology 5910 is designed for life scientists with a likely rusty background in calculus who wish to become comfortable with the mathematical techniques used to study biological systems. The project is central to this course, and the course material is designed to help get results that are genuinely useful.

Homework. Written homework will be handed out on Tuesdays and due the next Tuesday.

Computation. Simulating on a computer is nearly essential for studying any mathematical model. I use R for everything, and have put the link to download this free software on the website. Starting next week, there will be component of computer simulation in most of the homework, based on computer programs presented in class and which will be available on the web site.

Exams. There will be one mid-term, and a take-home final (more or less the equivalent of a homework assignment).

Projects. By the fifth week of the semester, the TA or I will have met with each registered student to discuss a project, ideally generated from your own research or interests. We will work together to find something interesting, worthwhile and feasible. Within these limits, almost any topic is fair game, but some connection to the course material would be gratifying.

Grading. Grades will be weighted according to the following scheme.

Midterm	20%
Take-home final	20%
Written homework	20%
Project	40%

COURSE OUTLINE
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Week of	Topic	Relevant book sections
Aug 26	Modeling, calculus and optimization	Chapters 2 and 4, Sect. 3.3
Sep 2	Discrete-time dynamical systems	Chapter 1, Sect 3.1-2
Sep 9	Meet the matrix	Supplementary material
Sep 16	Differential equations	Chapters 4 and 5.1–5.3
Sep 23	Systems of differential equations	Sections 5.4–5.7
Sep 30	Modeling infectious diseases	Chapters 4 and 5
Oct 7	Review and midterm	Chapters 1-5
Oct 21	Project ideas presented	Chapters 1-8
Oct 28	Probability theory and stochastic models	Chapter 6-7
Nov 4	Random walks and diffusion	
Nov 11	Statistics	Chapter 8
Nov 18	Project progress reports	Chapters 1-8
Nov 25	Special topic	
Dec 2	Special topic	
Dec 9	Project presentations	

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