

Mathematical Biology (Math 5120/6835) – Spring 2014

**Lecture :** T,Th 12:25-1:45, LCB121

**Instructor:** Aaron Fogelson, LCB312, phone 581–8150, email: fogelson@math.utah.edu  
Office hours: TBA

**TA:** Anna Miller, LCB326, amiller@math.utah.edu  
Office hours: TBA

**Course Web Site:** [http://www.math.utah.edu/~fogelson/5120\\_s14](http://www.math.utah.edu/~fogelson/5120_s14)

**Text:** No official text. Material will be taken from a variety of sources including:

1. L. Edelstein-Keshet, *Mathematical Models in Biology*, SIAM, 2005.
2. J. Keener and J. Sneyd, *Mathematical Physiology*, Springer, 2009.
3. G. de Vries, T. Hillen, M. Lewis, J. Muller and B Schonfisch, *A Course in Mathematical Biology: Quantitative Modeling with Mathematical and Computational (Monographs on Mathematical Modeling and Computation)*,
4. J.D. Murray, *Mathematical Biology 2nd Ed*, Springer-Verlag, 1993.
5. H. C. Berg, *Random Walks in Biology*, Princeton University Press.

**Material Covered:** The emphasis will be on partial differential equation (PDE) models in biology and on stochastic models in biology. PDE models typically arise when we are concerned with how things vary in space as well as in time. Most of the models we will consider are reaction-diffusion models. The biological topics will be diverse and will emphasize physiology. Some of the biological topics will include oxygen supply to muscles, nerve signal propagation, how muscles generate force, how patterns form in biological tissues.

**Problem Sets:** To be given out approximately every two weeks and will be due two weeks later unless announced otherwise. Homework is due when stated, late work will generally not be accepted. You may consult with other students in the class, after you have thought hard about the problems yourself. Each student should submit an individually written solution set. Answers will be posted on line at the course web site. Check the course web site for homework assignments if you miss class.

**Computing:** MATLAB will be used for some homework assignments. Our TA Anna Miller will give one or more MATLAB introduction and tutorial sessions during class time over the few weeks. These will meet in LCB115. The dates of these sessions will be announced later.

**Project:** The best way to learn mathematical biology is by doing it. This semester includes a significant focus on a project. By the fourth week of the semester, each student should have met with me to discuss a project idea, which will be presented briefly to the class towards the end of February. Each student will give brief presentation summarizing their project in class during the last week of class, and a written version will due at the final.

**Evaluation:**

Homework Problems: 30%, Midterm Exam 20%, Final Exam 25%, Project 25%.

**Prerequisite:** Prior work in multivariable calculus, linear algebra, and ordinary differential equations. Some prior work in partial differential equations would be help. Math 5110/6810 is a prerequisite for this course.

**ADA Statement:** The Americans with Disabilities Act requires that reasonable accommodations be provided for students with physical, sensory, cognitive, systemic, learning and psychiatric disabilities. Please contact me at the beginning of the quarter to discuss any such accommodations for the course.