

Mathematical Modeling – Math 445

Fall 2012 · MW 5:30 - 6:50 · Serra 155

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Office Hours: M 7:00-8:00pm (S155), M 8:00-9:30pm, W 7:00-8:00pm, F 11:45-1:15

Supplies

Texts: *An Invitation to Biomathematics* by Robeva et. al.

Laboratory Manual of Biomathematics by Robeva et. al.

Stapler: Any assignment you turn in which is more than one page long must be stapled.

Grading Scale

This subject matter in this course is diverse, and the nature of the subject does not lend itself well to written exams. Instead, your course grade will be based on homework and lab assignments, and a final group project. The grading scale below will determine your final grade.

Class Participation	.....	10 %
Homework	.....	25 %
Labs	.....	25 %
Group Presentation	.....	10 %
Group Modeling Project	.....	30 %

Homework

Homework is a critical component of any math course. Homework will assigned almost every class period, and will typically be due at the beginning of the next class period. I will normally assign several problems per class period, but I may not be able to grade every problem. However, I will be happy to go over any homework problem you have turned in with you in office hours. No late homework will be accepted under any circumstances, but your lowest homework score will be dropped.

The homework problems you turn in for a grade must be carefully written up in a clear and well-organized manner.

Any homework assignment may contain both individual and group problems. For the individual problems, you may still have conversations with the other students in the class, read other books and web pages, etc. However, you may not copy anyone's work. Any written work developed during collaboration with another student should be destroyed before writing your own solutions.

The group problems should be worked on in groups of 1 or 2 students only. Each group problem should be a collaborative effort, rather than simply dividing up the problems amongst the group. You will turn in only 1 well-written assignment per group, and each student will get the same score for that group homework. You may choose your own group unless I sense a problem developing, in which case I will make adjustments.

Lab Assignments – 30 %

Work will also be assigned out of the Laboratory Manual, to be turned in in class. These will be exercises on the computer which allow you to investigate particular mathematical models of biological processes. Any lab assignment may include a portion which is to be typed up as a small report, using either L^AT_EX (for mathematicians) or Word (non-mathematicians). Some lab assignments will be group assignments while others will be individual.

Group Modeling Project – 30 %

Groups of 1, 2, or 3 students will investigate a biological modeling problem of their choice, in consultation with the instructor. I will help you with ideas and finding data if you do not find this on your own. Research project may be any biological topic, as long as it allows the group to pursue a question using mathematical modeling.

Deadlines (details will come later):

- October 15: One-page proposal for your research project describing the biological question that you intend to address with mathematical modeling, including data (or source of data) you plan to analyze. 3 %
- November 12: Informal meetings between group and instructor where you describe the progress you've made, including initial model development. 2 %
- December 14: Final paper due reporting on group project. Each student will write and submit a personal version of the project report, even though it reports on joint work. 25 %

Group Presentation – 10 %

During our Final Exam time slot, at 5pm on December 17, the research groups will present their research projects to the rest of the class.

Goals and Learning Outcomes

In this class, we will study mathematical models for understanding biological phenomena such as population growth, drug dosage, epidemics, genetics, and cardiac function. In addition to learning the above content, students taking this class will be able to

- Analyze an unfamiliar problem
- Determine the type of data needed
- Select the appropriate mathematical tools to be applied, and
- Evaluate the results.