APPM 4390/5390 - Modeling in Mathematical Biology
Spring 2016

Instructor: Brendan Fry
Office Hours: Mon/Wed 1-2pm, Thu 1:30-3:30pm, or by appointment
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Class Time/Location: 3:00-4:15 p.m., MW, in FLMG 102

Texts: *Dynamic Models in Biology* by Ellner and Guckenheimer
Essential Mathematical Biology by Britton

Course Overview:
The goal for APPM 4390/5390 is for students to develop a fundamental understanding of how mathematics is applied as a tool to aid in studying complex systems in the biological sciences. We will thoroughly investigate case studies in several fields, possibly including (but not limited to) Molecular Systems Biology, Sea Turtle Ecology, Influenza Epidemics, Glucose Metabolism, Neuron Action Potential Propagation, HIV Pathogenesis, and Microbial Community Dynamics. Graded work will include a mix of theoretical and computational homeworks, as well as two research projects.

Practically speaking, this class is designed for advanced undergraduate and beginning graduate students in the mathematical, physical, and biological sciences with a solid mathematical background (i.e., Linear Algebra and Differential Equations). The course prerequisites (which can be waived with instructor approval) are APPM 2360 (Differential Equations and Linear Algebra) and APPM 3310 (Matrix Methods), and may be taken simultaneously with this course. Also note that familiarity with MATLAB or other programming language is assumed (prerequisites include classes which use MATLAB).

Attendance and Academic Integrity:
Students are expected to attend every scheduled class. It is the student's responsibility to keep informed of any announcements, syllabus adjustments, or policy changes made during scheduled classes or by email. The instructor's preferred mode of communication is via email, which is listed above. Students are expected to behave in accordance with the CU Student Honor Code and the College of Engineering's Academic Honesty Advising Guidelines. The guiding principle of academic integrity is that a student's submitted work must be the student's own. University policies can be found at http://www.colorado.edu/policies/student-honor-code-policy and http://www.colorado.edu/engineering/academics/policies/honesty; violation of either of these will result in an automatic final grade of F in the course.

Please be prompt to class. All electronics must be turned off by the beginning of class. This means cell phones, computers, etc. Your textbook may be helpful but is not required during most classes.

Homework:
Homework is an essential part of this course, and will be due roughly once every week or two weeks. Please return your homework by the due date at the *beginning of class* in clear writing (or typed) using complete sentences where appropriate. *Late homework will not be accepted.* Homework should be written neatly and show all work, and multiple papers should be stapled. You are encouraged to work in groups to exchange general ideas and help each other understand how to approach problems, but each student's work must be his or her own. You are also encouraged to ask questions during office hours. For the computational aspects of the course, we will be using the SimBiology toolbox in MATLAB. Now that CU has a site license, everyone should have access to this in ECCR 147.

Projects:

In order to further immerse students in the field, students will complete two projects during the course of the semester. For the first, you will get to work in groups, and describe a classic model in mathematical biology (due about halfway through the semester). For the second, you also get to work in groups (if you wish), and will have the option of choosing from a list of suggested topics or finding your own (due the final week of classes). Both projects will include both a written report (and contribution to the MathBio wiki page) and a presentation to the class. Stay tuned for more information.

Note that the distinction between 4390 and 5390 lies in the second project expectations. For 4390, students are expected to reproduce a result in the literature. For 5390, students are expected to develop their own model or extend an existing model of the biological phenomena of interest.

Also, the wiki will be at mathbio.colorado.edu.

Grade breakdown:

Homework	60%
Projects	40%

Other policies:

1. Dropping this course after the 3-week drop date will result in a W grade posted on the transcript, and full tuition and fees will be assessed. After the 10-week deadline, students must petition the dean in order to drop the course. See http://www.colorado.edu/registrar/students/academic-calendar/registration-calendar for important dates.

2. If you qualify for accommodations because of a disability, please submit to me a letter from Disability Services in a timely manner so that your needs may be addressed. Disability Services determines accommodations based on documented disabilities. Contact: 303-492-8671, Willard 322, and http://www.colorado.edu/disabilityservices. Disability Services' letters for students with disabilities indicate legally mandated reasonable accommodations. Answers to Frequently Asked Questions can be found at http://www.colorado.edu/disabilityservices.

3. Campus policy regarding religious observances requires that faculty make every effort to reasonably and fairly deal with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. See full details at http://www.colorado.edu/policies/fac_relig.html.