

Introduction to modeling (Math 2E03): introduction & administrivia

© Ben Bolker: September 7, 2010

1 Course goals

Primary: To learn the basics of mathematical modeling, primarily (1) applications of elementary algebra, calculus, and linear algebra, and (2) use of the R programming language to find numerical solutions to understand the behavior of dynamical systems and connect them with real-world questions.

Secondary: to learn and/or practice a variety of skills including critical and creative thinking and critical reading of papers from the primary scientific literature involving modeling.

2 Expectations

- attend and participate in class; do the reading and all the assignments; ask questions (including submitting your discussion questions online and participating in online discussions); think critically and creatively; work fairly in groups.
- **ask questions, in or out of class, when you don't understand something.** There is no such thing as a stupid question, and if you're confused you're probably not the only one.
- do your own work, avoid plagiarism of peers or other sources, and reference sources appropriately (see the "course information" page).

3 Assignments & grading

3.1 Class participation

There will be questions & answers, and discussions, in class and on-line, especially later in the semester when we read and discuss scientific papers. Periodically, you will need to submit *discussion questions* (DQs) on readings; these will be due on Avenue by noon the day *before* class. DQs are ideally conceptual questions — something you found interesting, or wrong, or puzzling about the paper and would like to discuss in class — but can also be about specific terms or points in the paper that you didn't understand and would like to go over in class. (10%)

3.2 Problem sets

For the first half of the semester, there will be problem sets/labs approximately weekly, which will consist of a combination of mathematical and programming exercises. You are allowed to discuss the problems with classmates, but the answers should be your own. (20%)

3.3 Projects

For most of the end of the semester you will be working on a group project with one or two other students. Everyone in the class will submit a 1-paragraph project proposal; these will be posted on the web and everyone will vote on their top 3 choices. I will then put students into groups. We will spend a lot of time in class working on the projects. Small progress reports will be due at intervals; the final project report (one per student) should be 5-10 pages describing the question, approach, and conclusions.

3.4 Exams

There will be an in-class midterm (15%) and a cumulative final (held during the registrar's time slot for this course, but lasting only 1 hour).

4 Computer stuff

We will be learning to program in the R language. You should definitely install R on your own computer. If possible, bring a laptop computer to class on lab days, or plan to share one; you should also have a USB key.

There is no required book for R programming, but I will post some information on R resources for those who would like sources of information beyond those offered on the web page.

5 Contact info

E-mail (preferred): bolker@mcmaster.ca. Phone (good luck): 905-525-9140 x23320. Web page (syllabus, updates, notes, etc.): <http://www.math.mcmaster.ca/bolker/courses/m2e03>. Office hours: TBA, or by appointment.