TENTATIVE

MATH 385 — Introduction to Mathematical Modeling
Spring, 2016

Instructor:
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Course Description:
A mathematical model considers a range of circumstance simplified by reasonably restrictive assumptions in which the interactions of mathematical constructs corresponds usefully to interesting aspects of real world behavior. We then want to use this correspondence for prediction, optimization and control.
A rule attributed to Einstein says, “Our model must be as simple as possible, but no simpler,” where the phrase “no simpler” means that the model includes the interactions which make it display the aspects of real world behavior in which we are interested.

Learning Goals:
1. Understanding how modeling works — what one tries to accomplish by it
2. Understanding some of the mathematical ideas and tools most frequently used
3. Seeing a variety of examples of comparatively simple models.

Schedule:
Class will meet   TuTh 1:00–2:15 in MP 101
Office hours:   TuTh 11:15–12:40 — and by appointment

The Final Exam will be Tuesday 5/17 1:00-3:00

Modules: Instead of a text, we will develop some relevant modules as we go. These will be of two types:

general modules    designed to show aspects of modeling

Topical modules    examples of standard families of models.

The class will work as a whole on the general modules, but there will be opportunities for choices of topical modules to be worked on by teams. Some particular topics I have in mind are: scaling a recipe, population growth, chemical reactions, transport (e.g., traffic or queuing or diffusion), epidemiology.
Final Exam: The Final will largely relate to what you should have learned from the general modules, but may also have some questions related to choices of topics. [...] more later [...] 

In addition (to be turned in at the time of the Final), is a take-home’ summary part of the Final, consisting of the following two questions:

(i) What have you learned in this course? (This should include a selection of some important/useful/interesting thing in the course, with some explanation of your choice.)
(ii) What grade do you think you deserve for this course (and why should I think so)?

Grading: I consider ‘C’ a normal grade, indicating satisfactory\textsuperscript{1} performance; therefore a ‘B’ must mean performance which is noticeably better than just ‘satisfactory’ and goes beyond the basics; an ‘A’ grade means excellence. Very roughly, ‘A’ for 90+%, ‘B’ for ‘80%, ‘C’ for 65%, ‘F’ for <50%.

I will compute the letter grade based on the Modules and the Final but will also take the take-home part of the Final strongly into account if your performance level is uneven or if you are near a dividing line.
The course grade should not be more than one letter away from the result of (i) — except that you cannot get a ‘satisfactory’ grade in any case if you still get significant ‘basic material’ wrong\textsuperscript{2}.

[If there is some justifiable reason for you to get an Incomplete in the course, prior arrangements should be made before the last class.]

Study with a buddy! It is not only acceptable but encouraged for students to study together and to work jointly on the assignments. Individual study is needed, but no amount of individual study provides quite the same advantage as the opportunity to explain things in your own words to someone else — definitions, procedures, theorems, and how to apply these to concrete examples (problems). This should become a regularly scheduled part of your activity. (For pretty much anything: If you can’t explain it, you don’t (really) understand it.)

In addition, you should be prepared for the possibility of missing a class by having telephone numbers, etc. of several classmates from whom you could then get information about announcements, assignments, details of what was covered, important insights, etc.

\textsuperscript{1}If, of the basic material which you should know, there is more than a third which you don’t know, that would be unsatisfactory.

\textsuperscript{2}Don’t be a mumpsimus!