## MATH 172 Mathematical Modeling for the Life Sciences <br> Spring, 2002

Instructor. Matt Miller, LeConte 300I, hours: MWF 2:00-3:00, and by appointment, phone: 777-3690, e-mail: miller@math.sc.edu, Internet URL: http://www.math.sc.edu/~miller/172

Texts. Required: Principles and Practices of Mathematics by COMAP and a graphing caclulator (TI-83 or higher preferred). There is the possibility of using the computer system Maple, but this will depend on our room assignment. If you have your MATH 122 or 141 textbook, this will be a useful resource.

Overview. You will possibly find that this course is very different from other math courses that you have taken. We will be less concerned with the mechanical aspects of computation, and more concerned with why we want to do these calculations. We form a mathematical model of a changing real world situation, such as population growth, use a variety of methods to analyze it, and then interpret our calculated results in the context of the original problem. We will solve problems by using a blend of numerical, graphical, and analytic methods (manipulation of formulas). Finally, in the real world, problems and solutions must be communicated effectively, both in writing and orally, and you will get a lot of practice doing this. Modeling includes problem solving, but is more comprehensive; we will learn how models are built, not just how to use them.

Course content. The course covers sections 1.1-1.7, 2.1-2.4, 3.1-3.3, 3.7-3.8, 8.1$8.5,9.1$ of the text (not always the whole section), and a few other topics (from your old calculus text). I also hope we will be able to do some small in-class labs, so you have real data to work with. You will be expected to recognize for yourself when the use of technology is appropriate, and when hand computation is called for.

Grades. Three major tests will be given, each worth 100 points. Scheduled dates are Friday, February 15; Friday, March 22; and Monday, April 22. At least six ten-point quizzes will be given; the five highest scores will be counted. There will be a comprehensive final exam, worth 150 points. No make-ups will be given on quizzes or exams, but the percent score on your final will replace your lowest exam score. The final exam is scheduled for Saturday, May 4 at 2:00 pm. No exemptions will be granted. There will be two group projects during the course; the first, due Monday, March 4, will be worth 25 points, and will serve as a warm-up exercise. The second will be worth 35 points, so I'll expect a little more when you've had some practice; it will be due Monday, April 29. Both the quality of the math and the exposition will be weighed. A total of 560 points may be earned:

| Exams | 300 |  |
| :--- | ---: | :--- |
| Final | 150 |  |
| Quizzes | 50 | (best five) |
| Group projects | 60 |  |

Letter grades will be announced separately for each exam, for the final, and for the overall project and quiz totals. They will generally fall close to the scale 85-100 A, $75-84 \mathrm{~B}, 65-74 \mathrm{C}, 55-64 \mathrm{D}$, below 55 F , but will vary up or down. Note that the deadline to drop this course without a grade of WF is Monday, February 25; you should have a pretty good idea before then how you are doing.

Collaboration. One of the goals of this course is to learn how to communicate mathematical ideas. You will be expected to work with one another in class and on projects; the grading of joint work will depend in part on evidence of genuine collaboration. However, you will have to take the exams individually, so don't get too dependent upon one another. According to the USC Student Handbook code of student academic responsibility, "the first law of academic life is intellectual honesty." I expect this of all of you. If you are ever in the least bit uncertain about the ground-rules, ask for clarification!

Attendance. Regular attendance is crucial for success in this course. Fifteen bonus points will be awarded for perfect attendance, 10 for only one absence, and 5 for only two absences. No excuses will be considered in this regard. This class has 42 meetings; university policy states that if more than $10 \%$ of the meetings are missed, whether excused or unexcused, then the instructor may impose a penalty. This is a very small class and each and every one of you has something to contribute, and as mentioned above, not all topics will be in the text. Therefore, if you miss 6 or more class sessions, I will lower your grade by half a grade point (from an A to a $\mathrm{B}+$, or a $\mathrm{C}+$ to a C , for example), and if you miss 10 or more classes, your grade will drop by a full grade point.

## Assignments

I generally make assignments week by week. You need to be in class every day to get the exact current assignment.

Jan. 14-18. See if you can get a copy of your MATH 122 or 141 final exam from your previous instructor, and see if you can still do the problems. Knowing how to do the hand calculations is vital for this course, but we will also use these problems and your solutions to give you some idea what the calculator/computer can (and should) do, and what it can not (or should not) do. Read 1.1, read 1.2 and do problems 1acd, 2acd, 10, 11, 12, read 1.3 and do problems 1ab, 2ab, 5, and read section 1.4.

