

## Math 360 Menu Applied Analysis

### Guidelines for Projects

This class will ask you to do three modeling projects, and this document supplies the general outline of how you should approach the project, and how you should prepare your written work.

First, here are some general rules.

1. You are free – indeed, encouraged – to work with the other people.
2. However, you are required to prepare and hand in your own, original report in the form specified below. It should be clearly, carefully, concisely, and neatly written, with any addenda (such as print-outs from a numerical solver) clearly labeled and explicitly discussed.
3. I know it sounds mean, but you will be graded not only on the quality of your mathematics, but also on exposition and writing. My assessment of your work will depend, however, mostly on the quality, inventiveness, and thoroughness of your math.

Each project will ask you to mathematically model and analyze some scenario. There will be some suggested reading, which will include some approaches to addressing the mathematics and a list of various problems from throughout the book that you should solve. The math will appropriate to the section under discussion; for example, project 1 will draw from Chapters 2 of the text. Your report should include the following sections, clearly labeled:

1. A written statement of the scenario to be modeled, including the various sorts of assumptions you made, and how to what extent these assumptions are realistic. Some assumptions may be more realistic than others, but may be justified on the grounds that the mathematics can be made easier.
2. Translation of words in mathematics, in this case, differential equations. You may have more, or less, complicated results, depending on how you vary your assumptions.
3. Solution of the mathematics. If possible, solve the differential equations explicitly. Often, however, you will have to resort to Maple (or some other numerical solver) to do computer experiments to come to terms with the more realistic assumptions. Include enough computer printouts to display your analysis. **But edit your work! Raw Maple printouts are very hard to read!** I really only want to see graphs, not long lists of Maple commands. If necessary print out the Maple worksheets, cut out the graphs, and paste them onto your report.
4. Analysis and conclusions. Have you achieved realistic answers? Do they make sense in your head? Can you find experiments in the literature that bear out answers? Or even disprove it? Feel free to go to the library or search the web for further resources.

This all sounds very complicated, but there is a templates: the book has many case studies, and you can model your writing on these. For example, in section 2.3 write down a basic model, and discuss solutions under simple assumptions. See if you can identify how they worked in sections 1 through 3 above.