Introduction to Mathematical Modeling

Professor:
Dr. Joanna Bieri
joanna_bieri@redlands.edu
OFFICE: DUKE 209

Project Checklist

Projects are graded out of 100 points. Please read the following information carefully and only check off a box when you are sure the project has achieved those goals.

- ☐ The solution to the project is a typed report, single spaced, 12pt font. The project is not more than 6 pages and you have condensed into it only the most important information. (5 points)
- ☐ The final report has been proof read by every member of the group. You are handing in work that you are proud of and is of professional quality! There are no grammar or spelling errors in the paper. (10 points)
- ☐ The final report has the following sections, generally in this order, and they contain appropriate information. (30 points)
    - **Introduction and Formulation** – This includes a clear statement of the problem being solved and a short background about the problem. Why is this problem important or interesting? This should also include a description of your model, a discussion of all of your assumptions and definitions for any variables or jargon that you are using. **I should see your general mathematical equations here.** Another scientist, or student in this class, should be able to plug his/her measurements into your equations and test your results. Why do the equations make sense? If I tried to recreate your calculations what would I need to do? Do your assumptions make sense?
    - **Results** – This is where you describe your basic results in a very mater of fact way. A table of your parameter values is really helpful! Show graphs and describe the numbers. What numbers did you find by USING your model. What range of parameters did you test? Were any of the parameters sensitive? Show graphs that demonstrate how changing your parameters changes the model results. Make sure to describe what you see in the graphs that makes them interesting. All graphs and tables should be referenced in the writing.
    - **Discussion** – This is a discussion about what you found. What do the results as a whole tell you? What do they mean or how do they answer your original question? Are there other possible models that might work better or worse than yours? Were there any BIG assumptions made that should maybe be reassessed? How much error is in your final answer?
    - **Conclusion** – This is a very short review of what you did in the paper. A reader should be able to read just your introduction and your conclusion and get the basic idea of what your model was, what results were, and why they matter.
- ☐ The **mathematics is clearly stated in words** along with equations so that another math student can understand it. Please EXPLAIN the equations. What do they mean in terms of the system being modeled. (15 points)
- ☐ All helpful information (graphs, data, computer programs, etc) has been included. It is also fine to put information in an appendix, especially if it is a large data set, but make sure to tell me what it is, your reader should not have to guess. All graphs, equations, and tables appear correctly in the paper. All tables and graphs are clearly labeled and referenced in your writing. It is ok to leave space and carefully write in the equations. (10 points)
- ☐ You worked well with your group and contributed to each part of the process. (10 points)
- ☐ The "it" factor! You have gone above and beyond the call of duty. You have gone beyond just saying what you think I want to hear. You added something unique to the model or used the model in a unique way. In the paper, you bring together multiple ideas from class and explain how they all fit to form a great model and give great results. This might be a unique graphical or numerical way of presenting the results, a really great description of the mathematics and assumptions, or an addition to the model that improves the answer. (20 points)
- ☐ There is at least one joke so your awesome professor doesn't get bored reading it. (Priceless)