

MATH 463: FINAL PROJECT INFORMATION SHEET

Prepare Outline of the Project By: Nov 9th

In Class Presentations: December 2nd - December 14th

Research Paper Due No Later Than: December 14th

A large part of your final grade rests upon the completion of a mathematical biology research project. This is your chance to make use of everything you've learned in the course from mathematical modeling to numerical simulation. The project has two components: a research paper and an in class presentation. Although, there is a great deal of flexibility in what you include in your paper and in your oral presentation, there are some general things you should definitely consider.

The Outline

Please prepare an outline of your project. The outline should, of course, be in outline form. It should describe what you plan to do for the biological background (including references you've found), what you plan to do for the previous mathematical models section (including references), describe what contributions you plan to make and what analysis and or simulations you plan to perform, finally describe how you plan to conclude your project report.

The Research Paper

Your research paper should include:

- a title page with the standard information
- an abstract summarizing the content of your paper
- an introduction to the biological system which provides the relevant background information necessary to understand the problem
- an introduction to the mathematical approach that describes the need for mathematical modeling, previous mathematical investigations, etc.
- a section describing **YOUR** contributions to the mathematical modeling effort
- a section containing **ORIGINAL** numerical simulations (sometimes debugging code can be time consuming so I wouldn't wait until the last minute)
- a conclusion section in which you give **YOUR OPINION** of the mathematical models you've researched, a summary of how your contributions effect the current understanding, and suggestions for future investigations

Many styles are possible for the body of your paper and although the exact format is left up to you; I have provided examples of two possible project styles below.

Focus on Model Development

One possibility is to focus on the development of a model that describes a biological system for which there has been very little mathematical modeling. In this case, the majority of your effort will be centered around deriving and justifying an appropriate mathematical model and performing preliminary analyses and simulations of the limiting cases.

Extending an Existing Modeling Approach

Many useful models of interesting biological systems already exist. Another possible way to arrange your project is to provide a review of previous investigations of the problem of interest, and then extend these modeling frameworks in ways which address biological questions that have not been fully answered. In this case, most of your effort will be centered around justifying your model extensions, performing analysis of the new equations, and predicting how your suggested modifications change the previously predicted behavior. This type of project differs from the one described above in that the focus shifts from model development to model analysis. That is, you will have a template to follow (from the literature) for what type of analysis will be useful and progress should be possible.

The Oral Presentation

You are required to make a 20 minute oral presentation to your classmates. Your presentation should be a condensed version of your paper. I will expect you to use overhead transparencies, powerpoint, a poster or some other type of visual aid to help you explain your biological/mathematical problem to the class. The 20 minute time slot is firm, presentations which take significantly less than 20 minutes will result in a grade reduction.

Please practice your talk and give a polished presentation as you are now the expert on your particular topic and must describe and explain its importance to the class.

A Note to the Audience

On days that you are not presenting, your **attendance is absolutely mandatory**. There will be a five minute question and answer period following each presentation. As an audience member and as part of *your* grade; your job is to pay close attention to the talk and you may be called on to ask at least one question at the end. Before leaving class, write down both the question that you asked and the speaker's answer to turn in.