MATH 563:
FINAL PROJECT INFORMATION SHEET

Decide on a Topic and Prepare an Outline of the Project By:
February 22nd

In Class Presentations: April 5th, 7th and 12th

Research Paper Due No Later Than: April 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. Note: If you are auditing the course and would like a passing grade, completion of this project is required. Although, there is a great deal of flexibility in what you may include in your paper and in your oral presentation, there are some general things you should definitely consider.

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 mathematics describing 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 spatio-temporal model of a biological system for which there has been very little or no PDE modeling. For instance, you may be interested in (or currently researching) a problem which has been traditionally modeled under the assumption of a spatially uniform domain. Insight into such a problem may be gained from investigating underlying spatial heterogeneities which are inherent in most biological systems. In this case, the majority of your effort will be centered around deriving and justifying an appropriate spatio-temporal model from first principles and performing preliminary analyses of the limiting cases.

Significantly Extending an Existing Spatio-temporal Framework

Many useful spatio-temporal models of interesting biological systems already exist. Another possible way to arrange your project is to provide a review of previous spatio-temporal investigations of the problem of interest, and then extend these modeling frameworks in ways which address biological questions that have not been fully addressed. 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 30 minute oral presentation to your classmates. Your presentation should be a condensed version of your paper. I will expect to you use powerpoint, overhead transparencies, a poster or some other type of visual aid to help you explain your biological/mathematical problem to the class. The 30 minute time slot is firm, presentations which take significantly less than 30 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 to ten 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 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.