

## MATH 566 Final Project Description

### Purpose

The purpose of the final project is to investigate a problem in numerical analysis that interests you. For example, if you are a mathematician, you may be interested in comparing (in detail) the accuracy, stability and convergence of some different numerical methods we discuss, or perhaps developing your own method. If you are a computer scientist, you may choose to implement (optimally of course) a software package for some complicated algorithm we discuss. If you are an engineer (or applied mathematician), you may be interested in applying some numerical method we discuss to some physical problem (for example, solving some ordinary or partial differential equations). The focus of your investigation should be primarily on numerical methods related to what we have discussed or will discuss this semester, although exceptions can be made in some cases.

### Important Dates

- Initial proposal: April 8, 2010
- Revised proposal: April 15, 2010
- Final project report: May 13, 2010
- Final project presentation: May 13, 2010 8:00–10:00am

### Proposal

You will submit a typewritten draft of a proposal for your final project on April 8, 2010. The proposal should contain the following information:

1. A description of the problem you wish to investigate for your project;
2. The numerical methods you plan on using, and a short explanation as to why you are choosing these methods;
3. The primary references you plan to work from.

I will read through your proposals and return them to you by April 13 with my comments and suggestions for improving your project. On April 15 you will submit a typewritten revised proposal based on my comments and suggestions.

### Project Report

The report for your final project will be typewritten and anywhere from five to ten pages long, excluding any code you wish to include in the report. The report should consist of the following information

1. **Introduction:** An overview of the problem you are investigating including some background information for readers who may not be familiar with the problem. If applicable, incorporate some historical background about the problem, including where the problem arises and other people who have worked on it.
2. **Formulation:** An explanation of the details of the problem, what numerical methods you used to investigate the problem, why you chose these methods. The “why” portion should tell about the accuracy and computational cost associated with the methods, and when the method is appropriate to use. You *must* clearly cite all sources you used in the project.

3. **Results:** The results of your investigation of the problem. This should include output from your program in nice tables and/or nice figures. You should also include some convincing data that verifies your method is actually working. This can be done by comparing the output of your program for a problem with a known solution.
4. **Conclusion:** A summary of your project, including what you have learned from your investigation, what more could be learned, any limitations of the methods you used for your investigation, and possible ways improve your methods.
5. **References:** A list of all the references you used in your project.
6. **Appendix:** A listing of your programs used for the investigation. The programs should be well documented and available in electronic form if requested.

## Project Presentation

You will be required to give a 25 minute oral presentation to the class about their project on May 13 from 8:00–10:00am. The presentation should be structured like the final report and should use overheads or the chalkboard. If you are planning on doing a computer presentation, then let me know so I can reserve a projector.

## Grading

The final project is worth 30% of your final grade. The breakdown for is as follows:

- Proposal: 4%
- Report: 16%
- Presentation: 10%