Important components with deadlines:

1. Short Description: due November 13.
2. Status Report/Rough Draft (optional, anytime before Dec. 1)
4. Final Written Report: due by 5PM, Wednesday, December 9th

The purpose of this assignment is to allow each student to develop expertise in some area of mathematical modeling by studying, developing and analyzing in some detail a particular model or group of models. In particular your project can be (1) a thorough investigation of an existing model, (2) a comparison of several models that claim to model the same or similar situation, or (3) the development and analysis of an original model. Your paper cannot be a verbatim version of an existing paper or book chapter. You must introduce some originality. No matter which type of project you attempt it should have the following components (approximate number of pages in the final draft are indicated at the end of the description).

Your project can be based on something you did or are doing for another class, however, you will need to modify it to fit the pattern described below.

If you have no project ideas, come and see me. I have several books that describe different types of models.

1. Abstract or Executive Summary: short description of problem and main results (1 page)
2. Description of real situation being modeled and attempts at modeling it. This involves a literature review of appropriate material. You should utilize many resources besides a web search. Try to find a book or some papers that are relevant. You should present a basic description of the various issues involved, explain how the model(s) are developed and why the model(s) are useful. Give the fundamental questions you are trying to answer. (2-8 pages)
3. Development of the model. The detail required depends on the type of model(s) you are using. You should write it so that the reader will understand the terms in your model and the meaning and values or range of values for the parameters involved. (2-8)
4. Analysis and Results. Using mathematical analysis, qualitative analysis, or numerical solution, study the behavior of the model. You should, if at all possible, try two different ways of coming up with results. Compare the results or properties of different models. Relate how the results relate to the assumptions of the model. This section also includes discussion of the accuracy of the model and the sensitivity of the model to changes in its parameters. (5-8)
5. Conclusions. Give the strengths and weaknesses of the model(s)/algorithms you studied and comment on how your study could lead to a new model which would address the weaknesses. If you have specific answers, comment on how they relate to known answers for the original problem. (2-5)

Some information about elements of the project cycle:

**Short Description** A 1-2 page description of what you think your project is going to be on. Give some references if you have them. I will give you some feedback (oral or written) on this.

**Status Report** This is a 5+ page draft of your final report. I will review this and give you feedback before the final aspects of your project. Thus the more you can give me the more I can respond to. (this is optional)

**Final Oral Report** This is a 10-15 minute oral report given to the class. You should present enough background and analysis to support some part of your conclusion. I will grade this as part of your Final Project grade.

**Final Written Report** The report should be a minimum of 10 double-spaced pages in length, not counting references or figures. It should be written in standard technical writing format: including an abstract or summary, followed by sections introducing the underlying problem, reviewing the modeling of the problem, analysis of the model, results, and conclusions.