APPM 4610 — Project Information

For the final project in this class, you will explore a numerical analysis topic that goes beyond what we have covered in class. You will work on this project with a team that has been randomly assigned. A list of possible projects has been provided. *A Google document will serve as the sign up sheet for the different project options.* At the end of the semester, your team will give a 10 minute talk about your project. You will also hand in a typed report and file with the corresponding codes.

Each project has a part that is roughly laid out in the **Project List** document which builds from the material in this course. The second part of the project is something that your group develops. **A two page proposal is due on March 15.** Office hours after Midterm 2 will be dedicated to helping students work on the project. Additional meetings with the instructors will be available as well. **A rough draft of the project is due on March 31 and the final project is due at your final exam time.** For each milestone, you must meet with an instructor and/or the TA to ensure that you are making adequate progress and to have questions answered. The instructors and TA's will be keeping track of these meetings. Not meeting with an instructor and/or TA for a milestone will count as point deduction for the milestone.

You will receive structured feedback on your proposal and rough draft. Please take this feedback into consideration as you continue to work on the project.

Point breakdown and schedule

	Percent value	Due date
2-page proposal	10%	March 15
Rough draft	25%	April 1
Final draft	55%	Final exam date plus any extra days prior to final needed.
Presentation	10%	Prior to final exam date

Project proposal

The project proposal is a two page document where you are going to lay out the plan for the project and how the work is going to be distributed amongst the group members. You are expected to update the instructor if you are going to deviate from this plan. Specifically, you will be graded on the clarity of presentation, the organization of the proposal, the explanation of how you will present the introductory material, the explanation of the objectives for the independent part of the project, a timeline for achieving milestones and the distribution of work amongst the group members. All members should participate in researching, writing, coding and presenting activities. Full credit will not be given to students who do not participate in each aspect of the project.

Point breakdown for 2-page proposal

Clarity	30%
Organization	20%
Introductory material	5%
Independent extension	25%
Proposed timeline	10 %
Distribution of work	10 %

Rough draft

The final project report should be **single space with font size 12 (courier, Times New Roman or Arial) and around 8 pages without figures and codes**. Your rough draft may be shorter. Just ensure that you address the items listed below as part of the rough draft milestones. *If your project reads as an encyclopedia (i.e. essentially copied directly from resources), you should expect a low score.* The report will be run through plagiarism software.

The rough draft of the paper should have a section for every section that is expected in the final draft. Several sections should be complete in this draft. This includes the introduction and all sections related to the introductory material. *Note, the presentation of the introductory material should not just be a copy of the project statement.* Some numerical results should be included in this content. In the sections for the independent part of the project, you should provide the information you have so far and descriptions of what content you plan to include. This draft is not expected to be perfect but you should have something pretty close to the final result at this point.

Point breakdown for rough draft

Clarity	20%
Introduction	20%
Presentation of introductory material	20%
Presentation of mathematical derivation	10%
Presentation and explanation of numerical results	10%
Complete plan for the independent part of the project as well as some completed work	20%

Report information

The project report should be single space with font size 12 (courier, Times New Roman or Arial) and around 8 pages without figures and codes. *If your project reads as an encyclopedia (i.e. essentially copied directly from resources), you should expect a low score.* The report will be ran through plagiarism software.

Your project will be written in a manner similar to a research or journal article. It should be typewritten, although lengthy derivations can be handwritten and included in an appendix. Your paper should not be a random collection of facts. You should identify at least one specific question/problem. The goal of your paper is to answer that question. Therefore, the problem choice, mathematical development and explanation of the problem is very important. You should try and get a "big picture" view of what you are trying to accomplish with your project. The report should have figures, tables, sections, etc. properly labeled and referenced. If you do not know how to do this, please see the instructor or the TA.

The report will be submitted to the instructor via email by the date/time of the final exam meeting.

Your paper should have the following sections:

Abstract A short (1-2 paragraphs) summary of your problem and results. After reading your abstract, the reader should have an idea of the topic of your paper and what you accomplish in your paper.

Introduction: This section serves to introduce your topic, provide motivation for why your topic is important and provide any background information. Include motivation and a survey of other people's work and/or a short discussion of the existing literature, as appropriate. Provide all necessary definitions and concepts for me (assume the reader is ignorant of your particular application) to understand the question you are studying. Provide references as appropriate. (This section may be anywhere from 1-2 pages long.) State explicitly what you are planning to do in the upcoming sections of the paper.

Model development/mathematical formulation for introductory material: This section serves to develop your model. All symbols should be defined/identified. Any approximations you make in going from your physical model to the mathematical model should be noted. Lengthy derivations can be included here or placed in an appendix. Results (and proofs, where appropriate) can be included in this section or can stand alone in their own section.

Numerical Work or Examples for introductory material: This section describes your algorithms and/or numerical work and/or examples. A descriptive summary of your code and results can be included here. You can put any (well-documented!) code that you write in the appendix. Graphs and/or tables with data you used or computed should be in this section.

Introduction to the independent extension: What have you explored in the independent part of the project? Why is it important or interesting.

Model problem/mathematical formulation for independent extension Provide a derivation of the algorithm or problem and what is expected of it.

Numerical results for the independent extension Provide numerical results and comment on the performance of the techniques or model.

Discussion/Conclusions: What did you find? Is it what you had expected? How can you use your results? What do they tell you about your original question? Is there any pertinent future work that should be done, *i.e.* how could/would you continue to further your understanding of this topic?

References All books, articles, and websites used in the preparation of your paper should be documented in this section. Note that if you do not properly document your references and attribute the results that you used to the proper sources, then your work is plagiarism. **You must have at least 3 non-internet/non-web references, *i.e.* actual books or journal articles that you referred to for your project.**

Additional items to keep in mind:

- You will be assigned to groups of at least 2 and no more than 3. Each group needs to turn in only one copy of the project.

- Cover pages are not needed, just a title, date, the name of each of your group members (in alphabetical order) at the top of the first page.

- Your project will be submitted electronically to your instructor.

- Give complete definitions of all terms and symbols used.

- Numerical development and/or examples, explanation and discussion are important.

- Writing style, clarity and completeness of explanations are also important.

- Figures, graphs, and tables should have labels, captions and legends, as appropriate. You should discuss each figure in the text, as in "We see from Figure 3 that ..." If you do not discuss it in the text, it should not be included in the report!

- Reference facts that you state in your paper. Include all references at the end of the paper. You should include references beyond those provided in the project descriptions.

- In general, code should be in an appendix and graphs and figures should be in the text where they are first discussed.

The point breakdown of your final draft is as follows:

Point breakdown for final draft

Teammate grade	10%
Introduction	15%
Presentation of introductory material including numerical results	20%
Introduction of independent part of project	10%
Derivations associated with independent part of project	20%
Numerical results for independent part of project	20%
Conclusion	5%