List of suggested topics for projects in Math 254

Numerical analysis

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Students will work in groups of no less than 3 and no more than 5. Each group will choose a project topic and they should create a 15-20 min presentation talk to discuss their project and present their results. All groups will present their talk to the class in the last week with no exceptions, and submit their slides to the lecturers for grading.

Here is a list of suggested topics, which you can choose; it is also possible to propose another topic for your project.

1) Choose a scientific (real world) problem of interest, learn how numerical methods are used to aid in the research of that problem. Solve it using one or an extended version of any numerical methods that covered in the class and implementing them in MATLAB.

2) Choose one of the numerical methods that covered in the class. Develop an error analysis and use different examples that implemented in MATLAB to support your discussion.

3) Choose a section of the text that introduces a numerical technique to solve a problem that will not be covered in class. Learn how to apply it and study how accurate it is. Also, discuss if the are other numerical techniques for the same problem available.

4) Choose a paper from the literature that also introduces a numerical technique to solve a problem. Learn how to apply it and study how accurate it is. Also, discuss if the is any relation between the technique and other numerical methods that covered in the class.

5) Choose any concepts presented in the class, for instant rate of convergence " big oh notation", Order of Convergence "linear or quadratic". Study it in details and give some examples.

Your project must contains all of the following elements:

- Some discussion of the origin and history of the algorithm you discuss.
- A technical mathematical discussion. You do not need to provide full proofs of every statement, but the presentation should follow a solid logical sequence.
- An implementation in MATLAB of the topic.
- The presentation should consist of the necessary graphs, tables, programs, etc.
- Some examples that different than any example used in your sources in order to show that you have understood the method.

6) Choose one of the sections that listed in the syllabus and prepare yourself to give a lecture. We are expected you to

    - Present the material in a clear, well-structured and meaningful way.
    - Cover all the details in a logical sequence.
    - Do not read your notes or slides.
    - Manage your nerves.
    - Speak loudly and clearly.
    - Create opportunities for students to ask questions and joining in discussions.
    - Keep track of the time.

The Student Grade in the Course 254 Math will be based on the following decomposition

- 20% Midterm 1
- 20% Midterm 2
- 5% Project
- 15% Tutorial
- 40% Final Exam