Term Project

AMS 510, Fall 2020

Description

Throughout the semester we will explore a number of mathematical concepts from linear algebra and advanced calculus. Because of the time needed to adequately discuss these ideas, there is not as much time as we might like to investigate applications of these concepts. Moreover, due to the size of the class and everyone's varied backgrounds, it would be near impossible to find applications that interest everyone.

The goal of this project is for you to connect several math concepts to an application of your choice. As outlined below, your paper will need to introduce the application and then briefly describe how several math concepts can be applied to that application. Your selected application can come from your professional aspirations, your personal interests, or anything in between.

The project will be submitted twice. The first submission will undergo a round of peer review, after which you will have the opportunity to revise your project. The second (final) submission will be graded by the instructor or a TA. The same rubric (given below) will be used throughout. The target audience of the project is an AMS 510 student.

You are strongly encouraged to use the Writing Center as you prepare your project. More details can be found at `http://www.stonybrook.edu/writingcenter/`

Grade Breakdown

In total, the term project is worth 20% of your final score in AMS 510. This 20% will be allocated as:

- 8%: Submission of the first draft and participation in the peer review process.
- 12%: Quality of content in the final draft, as scored by the rubric presented at the end of this document.

Important Dates

These dates are tentative. Any changes will be announced in writing (email and/or Blackboard).

- September 8: (Optional) Your choice of application and selection of math concepts are due, if (minimal) feedback on appropriateness, suitability, *etc.* is desired.
- November 9: The first draft of your project is due.
- November 16: Your (anonymous) reviews of classmates' projects are due.
- November 30: Your final draft is due.

Project Structure

Your project must be typeset in LaTeX using the template provided to you, which is based on the template for a SIAM publication. Your project should address the following points.

- **Introduction:** Give a brief background/history of your application. What is it? Why do you find it interesting? What details of the application must the reader know to understand and appreciate the application's connection to your math concepts?

- **Math Concepts:** What math concepts are you relating to your application? For each math concept you should address the following questions:

  - What is the math concept? Emphasize an explanation of the math concept over a formal definition of it.
  - How does the math concept relate to your application?
  - What does the application gain by successfully using the math concept? Alternatively, what is lost by the application in the absence of the math concept?

  You should discuss **three** math concepts in your project. One of them must be a linear algebra concept and one must be an advanced calculus concept. The third can be a math concept from any branch of mathematics. Note that an equation, a number, a vector, a matrix, a function, *etc*. are too trivial for this assignment and will not receive credit. **Be creative!**

- **References:** List your sources! These are likely to be journal articles[1] or books. Websites should only be used as a last resort and if curated by a trusted source. For example, Wikipedia should not be used; it may be a great place to find general information, but should not be cited. Verify the information on Wikipedia from other sources and cite them instead. At least **two sources** that are *not* a textbook for AMS 510 should be cited. You should use BibTeX and the SIAM format for your references. Referenced work must be written in English. You should have in-text citations to your works cited list throughout your project to indicate the specific source of a statement in your discussion.

Your project should be around 2 pages in length, using the provided template. This includes the title, main text, references, and any images, *etc*. If you think you need part of a third page, please contact the instructor in advance with a justification. Otherwise, content appearing on an unapproved third page (or fourth, *etc*.) will be neither read nor scored.

Milestone: Choice of Application and Math Concepts

You can receive feedback from the instructor or a TA on your choice of application and selection of math concepts, if they are submitted by the date specified above. The information you provide and feedback you receive at this step will be minimal. This milestone is **optional** and is intended to help you make sure you're set up for success on the term project.

Milestone: First Draft

Your first draft must be submitted by the deadline so that it can be peer reviewed. It is expected that your first draft is a "good-faith" submission, meaning it is not a placeholder that you plan to replace in the second submission. In addition to the peer review, the instructor/TAs will examine your paper to determine if it is a "good-faith" submission. On-time and "good-faith" submissions will receive full credit for this milestone; other submissions will receive partial or possibly no credit.

[1] SIAM Review or SIAM News may be great places to investigate.

Do not include your name, student ID, or any personally identifiable information in your first draft. The peer review is to be double blind. The instructor/TAs will know, through Blackboard, which submission is yours. Full credit for this milestone will not be awarded if your paper is identifiable to other students.

Milestone: Peer Review

You will review 4 of your classmates' first drafts using the rubric presented below. You will not know whose submissions you are reviewing, nor will they know your identity. Logistics of the review process will be discussed at a later time.

The goal of this step is for you to critically assess your project, as well as your classmates'. Sometimes the best introspection is accomplished after seeing what worked (or didn't work) for other people. Bear in mind: although this step requires you to be critical, **you should always be constructive in your criticism**. How would addressing your criticism(s) help the author improve his/her project? To ensure that thoughtful/useful/constructive peer reviews are provided, the instructor/TAs will audit the peer reviews for quality and tone. Full credit will not be given for the peer review if the comments you provide are deemed unprofessional or unconstructive. Note that the scores you receive from your peers will not impact your grade.

To help you provide more useful comments to your peers when you review their projects, I list here what I anticipate to be several common problems:

- The discussion of math concepts is too detailed. Try to keep your discussion *conceptual* so that the role of the math concept in the application is not muddled by an excess of detail. Equations are not required, and in many cases are unnecessary. If you choose to include equations, make sure you explain what they represent and how they relate to the application.
- The math concepts and application are seemingly unrelated. In most cases, this is a consequence of not effectively introducing the application and foreshadowing the math concepts in the introduction.
- In-text citations are missing.
- Images are improperly used. If you think it necessary, it is fine to include images (along with proper citation and attribution). However, make sure you discuss the image in your text. Why did you include it? Images are distracting, and potentially confusing, to the reader if only included for visual stimulation.

Milestone: Final Draft

After receiving comments from your peers, you will be given some time to revise your project. You will then submit a final draft that will be scored by the instructor/TAs.

Rubric

Each criterion will be equally weighted towards your assessment.

Criterion	Excellent (Full Credit)	Acceptable (Partial Credit)	Fail (No Credit)
Formatting, Writing Quality,[2] & References	Formatting guidelines (LaTeX template, length, *etc.*) were followed, and the project is both easy-to-read and free of typos. At least 2 suitable references were provided and cited in the text.	Some or most formatting guidelines were followed, typos were noticeable, or the project was sometimes difficult to read. References were insufficient or unsuitable, or in-text citations were missing.	The formatting guidelines were not followed, typos were excessive, or the project was indecipherable. No suitable references were provided, or references were not cited in the text.
Content: Application	The application was introduced well sufficiently discussed.	Some relevant details about the application are not addressed.	It is not possible to understand the application from the discussion.
Content: Linear Algebra Math Concept	The math concept is well discussed and related to the application.	The math concept is somewhat unclear, or its relation to the application is somewhat unclear.	The math concept or its relation to the application is unclear.
Content: Advanced Calculus Math Concept	The math concept is well discussed and related to the application.	The math concept is somewhat unclear, or its relation to the application is somewhat unclear.	The math concept or its relation to the application is unclear.
Content: Miscellaneous Math Concept	The math concept is well discussed and related to the application.	The math concept is somewhat unclear, or its relation to the application is somewhat unclear.	The math concept or its relation to the application is unclear.

[2] I recognize that you may not be a native English speaker; I do not necessarily expect flawless English in the writing. However, the English must be understandable. If you think this may be an issue, I strongly recommend you consult the Writing Center!