

APMA4901: Seminar in Applied Mathematics, Fall 2023

Mondays, Wednesdays 11:40am-12:55pm

IN PERSON, NOT ON ZOOM

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this document available online via <http://bit.ly/4901info>

schedule available online via <http://bit.ly/f2023seminar>

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The seminar in applied mathematics is a required course for Columbia juniors and seniors majoring in applied mathematics, and is open only to undergraduates majoring in applied mathematics.

The junior seminar meets every Monday and Wednesday. We will have a variety of speakers, including faculty, researchers, and senior applied mathematics majors. Lectures will be focused on the research and the varieties of experiences and skills known as applied mathematics. By the end of the semester you should know the area or areas of applied mathematics that are most of interest to you, how to become expert in this area by the time you leave Columbia, and what you might do with this expertise after graduation.

To give you a better idea of the goals of the class, here are a few quotes from previous years' juniors:

The seminar was a good way to see how seniors were able to do creative research in various topics. It also encouraged me to find a research topic and get a broader and better understanding of my future options in the world of Applied Mathematics.

This seminar has helped me to better understand why I am majoring in applied math at Columbia as well as expose me to the nature of the challenges and problems that I will face. [T]he most valuable information that I have taken away from this course [is] how the department is actually interested in me and my studies.

I got through the first two years of Applied Math without really knowing what it was.

The junior seminar has filled this void that I presumably share with a lot of applied math majors entering their junior year: it simply helps you to understand what exactly applied math is. In a broad sense, it exposes you to the various career paths following an applied math major. When I originally decided to major in applied math, I was convinced that the only thing to do with this major is either teach or go into finance. However, many interesting careers have been presented to me

I entered the seminar thinking applied math would lock me into one career path. I leave the seminar thinking just the opposite, that my major is the most versatile one offered by the engineering school.

And hopefully you will find

These examples changed my previous notion of Applied Math as a derivative of Math limited to computing and programming, and made me realize that how artistic and imaginative our work can be by weaving math models into any other disciplines.

or even

In sum, this seminar helped reassure me that I did in fact pick the right major for myself.

To help you learn about the varied tools of applied mathematics and the varied areas of application, we will be having a number of external lectures from graduate students, post-doctoral researchers, and faculty. This will help you learn about the different research in applied mathematics at Columbia, exposing you to some of the ways that the mathematics you are learning in your other classes can be applied, and help you develop a sense for what areas of the field are of most interest to you. Do not hesitate to ask questions of technical or non-technical nature, either during class or at your own convenience.

I will try to close each lecture with some final thoughts, both to summarize and to make connections with the other lectures and with the material you are learning in your other classes.

The senior applied mathematics majors will also attend the lectures, and you should feel free to ask them questions about the major and benefit from their experience. Both Juniors and Seniors can use these lectures to formulate possible research topics and postgraduate plans.

1 Grading policy

For reasons I don't understand, the registrar has listed 4901 as being "for 0 or 1" point credit. I don't know how this happened but please switch to "1 point credit".

Your grade will be a function of 3 things:

1. attendance: If you find that this hour is not valuable, your job is to tell me why. My job is to change things so that it is valuable. I am happy to hear suggestions or requests for particular external speakers or subjects covered.
2. at least five constructive comments for five different speakers, of 140 characters or more, posted the same day the speaker presented, to <http://bit.ly/4901f2023c> . If they are suitable, I will anonymize and send to speaker. If not, I will tell you and it will not count for credit.
3. I want your personal answer, in writing, to the following question: What did you learn during these lectures this semester? The answer should be at least

400 words. There should be no external research necessary: I just want your honest answer. Post the answer with your uni to <http://bit.ly/4901f2023f>.

Please do be honest in this and all other feedback you give the applied mathematics faculty. To quote one of previous years' juniors

Interaction between myself and my professors/department is up to me. While it seems obvious that the department is interested in bettering itself, I often feel like my criticisms are possibly skewed or incorrect and that my input might not necessarily be welcomed. It is reaffirming and to learn that the professors in the department truly want to hear from the students how they could improve the program.

This document should be submitted via google form before 5 pm on the last day of classes.

2 legal disclaimers: grading

Please note that the Faculty Handbook makes explicit constraints on what I can and can not do when it comes to grading. Although it is preceded to make unusual arrangements for a student before a grade is assigned, e.g., for health reasons or other extenuating circumstances with approval of a dean, "Once qualitative grades are given, they may not be improved through the submission of additional work by the student." "Changes to final grades normally may be made only to correct an error. . . . The grounds for changing a disputed grade are very limited."

3 legal disclaimers: plagiarism

<https://bulletin.engineering.columbia.edu/academic-integrity-and-discipline> makes clear Columbia's (and therefore my) policies regarding plagiarism, singling out the use of online material:

One of the most prevalent forms of plagiarism involves students using information from the Internet without proper citation. While the Internet can provide a wealth of information, sources obtained from the Web must be properly cited just like any other source. If you are uncertain how to properly cite a source of information that is not your own, whether from the Internet or elsewhere, it is critical that you do not hand in your work until you have learned the proper way to use in-text references, footnotes, and bibliographies. Faculty members are available to help as questions arise about proper citations, references, and the appropriateness of group work on assignments. You can also check with the Undergraduate Writing Program. Ignorance of proper citation methods does not exonerate one from responsibility.

The site also makes clear what sanctions will result.

4 logistics and laptops

- Usually I sit in the back of the room, emailing students I see on Facebook during class. As an experiment this term I will sit in the front instead. If you see me using my laptop rest assured it'll be to research the article being presented, or a Wikipedia page on the technique being discussed. I encourage you to do the same, but please sit in the back if you're using a laptop so as not to distract students who are paying attention.
- Usually I invite alumni to speak so that you can see how the material you are learning relates to careers for which your skills are in high demand. Based on feedback from prior students I will not be inviting alumni this term. If you'd like to hear from alumni let me know and I'm happy to work with your student chapter of SIAM to set up a talk (or talks?) from alumni.

5 links

If you want to look back at the links from day one of the class, you can find them here:

- instructions, 4901: <http://bit.ly/4901info>
- instructions, 4903: <http://bit.ly/4903info>
- day 1 presentation file: <http://bit.ly/4901day1>
- 'good talk': <http://bit.ly/examplestalk>

also:

- 4901 anonymous survey: <http://bit.ly/4901f2023s> (complete asap!)
- 4903 anonymous survey: <http://bit.ly/4903f2023s> (complete asap!)

6 Canvas

There is no canvas for this class. This instruction document is canonical

7 Courseworks

There is no courseworks for this class. This instruction document is canonical

8 Slack

I actually made a Slack for this class! You are required to join it but you are not required to look at it. The canonical information is all in this document. Here it is! <https://apma2023.slack.com/>