

Math 188 – Algebraic Combinatorics (Spring 2021)

- Lecture times and location: pre-recorded lectures posted on class website
- Textbook: Bruce Sagan, *Combinatorics: The Art of Counting*
- Course website: <http://math.ucsd.edu/~ssam/188/>
- Instructor: Steven Sam ssam@ucsd.edu
- Office hours: via Zoom, see website for details
- Discord invite link: <https://discord.gg/K4QEsKa3js>

Course description

The main topics are: counting techniques, combinatorial identities, generating functions, sieving methods, and counting up to symmetry. We will do mathematical proofs in this course, so the ability to read and write proofs is crucial. The contents of Math 184 (as I teach it) are a strict subset of this course, so **students looking for a less demanding experience should take 184 instead**. Familiarity with linear algebra (Math 18) and basic group theory (Math 100A or 103A) will be assumed.

Most of the topics can be found in Sagan's book (the first 6 chapters), though we will not follow its order and we will skip some of the topics. A schedule of topics will be posted on the website and updated as necessary. I will add a few things not in the book, so a copy of my own notes will be kept on the website.

Expectations

Lectures will closely follow my custom notes. You can find more examples and exercises in the textbook. You are encouraged to work on homework with others, but solutions must be written up individually.

Any students may attend the office hours without appointment. This is a small class, so I hope to be able to meet all of you. Office hours are an underused resource, so feel free to drop in even if you don't have questions about homework. If you need to meet with me at another time, please email me to schedule.

For organizing discussion, there is a Discord server: <https://discord.gg/K4QEsKa3js>

All students are expected to use this server, and **announcements will be made there instead of via email**. Any questions about the course or the material should be posted there. Please do not email me about general topics: it is more efficient to have everything in one place. Also, please refrain from posting solutions to homework, but hints are fine.

If there are issues that cannot be discussed publicly, please email me.

Academic integrity

<https://academicintegrity.ucsd.edu/>

You are free to collaborate on homework, but the final writeup must be done individually. If you work with other students, please list their names on your assignment (this will not affect your score). Please refrain from looking up solutions or soliciting help online, I really would rather help you myself so that I know which topics are giving students trouble.

Grading policy

- Homework: 50%
- Project: 50%

I do not follow standard cutoffs for letter grades but will not be any stricter. So, for example, a 90% score will guarantee an A- or higher, but the actual cutoff for an A- might be lower depending on how the course goes.

Homework

Homework is due via Gradescope (every Friday by 11:59PM). I plan for there to be 9 assignments. This is a vital part of the learning, so no homework scores are dropped. You may turn in assignments late with penalty: -20% for each day late (additively applied). To account for possible emergencies, your first late assignment will not be penalized. However, I will release solutions 3 days after they are due, so no assignments can be accepted after that (write to me before that if there is a serious issue).

Solutions are graded for clarity and correctness. Correctness is just as important as communicating clearly. So, when appropriate, explanations should be given in complete sentences.

Project

The project replaces the final exam (not doing it is an F in the course). Students can work in groups of 1 or 2. The goal is to find a topic related to the course, create a 20-30 minute pre-recorded presentation, along with a 3-5 page typed report. There are some preliminary components which account for some of the grade. Details and a list of example topics can be found on the class webpage.

Additional logistics

Students that need special accommodations should talk to me as soon as possible.