Math 184 Syllabus

Fall 2026

Lecture: Monday, Wednesday, Friday 11:00-11:50pm in Center 113
Discussion Section: Friday 3:00-3:50pm, and 4:00-4:50pm in AP&M 6414. Please feel free to attend the discussion section that is most convenient for you.
Course Webpage: `http://cseweb.ucsd.edu/~dakane/Math184/`

Professor: Daniel Kane
Email: dakane "at" ucsd.edu
Office Hours: Wednesday 1:30-2:30pm and Friday 12:30-1:30pm or by appointment in AP&M 7131

TAs:

Srinjoy Srimani Office hours: Monday 2-3pm and Tuesday 3-4pm in HSS 6012

Course Description: Math 184 will be an introduction to combinatorics. We will study a number of topics for understanding and proving things about discrete objects. Topics include: mathematical techniques like mathematical induction and the pigeonhole principle; basic counting techniques for dealing with permutations, combinations and lists; and advanced counting techniques such as inclusion-exclusion and generating functions. Time permitting, we will also study some basic questions relating to pattern avoidance in permutations.

Prerequisites: A grade of at least C- in Math 109.

Textbook: The textbook for the course will be *A Walk Through Combinatorics* by Miklos Bona, fourth edition.

Exams: There will be three in-class exams on October 14th, October 28th, and November 18th in addition to a final exam from 11:30-2:30pm on December 8th.

Homework:
Submission Policy: Homework will be assigned due each week excepting the first two weeks of class, the last week of class, and weeks with exams. Homework should be submitted on gradescope and will be due by 11:59pm on Wednesday the week that it is due. To accommodate exceptional situations such as accidents or serious illness, your lowest homework score will be dropped. I will attempt to have new homeworks available on the course webpage at least a week before they are due, and generally homeworks will be on material covered in class before they are released. To get an account for the gradescope for this course (if one was not created for you automatically), use entry code RRKR6K.

Write-up Guidelines: Unless otherwise specified, all homework problems will require you to justify your answers. This will usually mean that you provide some sort of mathematical proof to justify your claims.

In addition to this you should make sure to write your solution either in clear handwriting or typed using a computer. Use of LaTeXor similar typesetting package is recommended (for those unfamiliar, there is a basic introduction to LaTeXon the course webpage at `http://cseweb.ucsd.edu/~dakane/Math184/latexGuide.pdf`). If the graders are unable to decipher your writing, you will not get credit for it.

Collaboration Guidelines: Students are encouraged to collaborate on homework assignments. You should feel free to discuss the problems and talk about how to come up with solutions with each other. On the other hand, you are expected to write up your solution independently of any collaborators, and you *should not* share written solutions to homework problems with other students before the homework deadline. If you do collaborate with other students on the homework, you should make sure to list any collaborators that you had on any given problem.

Use of Outside Resources: You should not attempt to search for homework solutions online or in sources outside of the course text. You may use such sources as a study guide, but if you accidentally stumble upon a homework solution in such an outside source you should cite it in your homework solution. If your solution proves to be too similar to the cited one, you may lose credit on the problem, however failure to cite the other solution will be treated as academic dishonesty.

The same policy also applies to AI use. You are welcome to use AI as a study tool, but you may not ask it for hints or solutions to homework problems nor for help in writing up homework solutions. If in the course of studying with it, it happens to produce a solution to something near-identical to a homework problem, you should provide logs of the relevant interaction in your homework solutions.

Academic Integrity: Academic integrity will be taken very seriously be the course staff. Breaches of integrity may have broader consequences outside of the assignment in question. The following will all considered to be breaches of academic integrity:

- Collaboration on homeworks beyond the scope outlined in the section above (including sharing of homework solutions with other students before the homework deadline).
- Failure to cite collaborators on homeworks or outside sources used to find homework solutions.
- Use of AI to intentionally find homework solutions.
- Collaboration or copying on exams of any kind.
- Use of aids on exams outside of explicitly allowed materials (this may vary by exam).

Grading: Course grades will be determined using the following breakdown:

Homework:	10%
Midterms:	$3 \times 20\%$
Final	30%

Commencement of Academic Activity: If you need certification of commencement of academic activity for financial aid purposes, please fill of the Canvas quiz by the end of the day on October 9th.

Schedule: Below is a rough schedule for topics covered in the class:
Mathematical Induction (Chapter 2)
Pigeonhole Principle (Chapter 1)
Counting Permutations and Strings (Chapter 3)
Balls and Bins Problems (Chapter 5)
Permutations and Cycle Structure (Chapter 6)
Inclusion-Exclusion (Chapter 7)
Binomial Theorem (Chapter 4)
Generating Functions (Chapter 8)

Time permitting:
Pattern avoidance in permutations (Chapter 14)
Partial orders (Chapter 16)
Combinatorial Designs (Chapter 17)