

Math 184A Syllabus

Spring 2018

Lecture: Monday, Wednesday, Friday 4:00-4:50pm PETER 110

Discussion Section: Thursday 8-9am or 9-10am in AP&M 2402, or 6-7pm or 7-8pm in AP&M B402A or CENTR 220

Course Webpage: <http://cseweb.ucsd.edu/~dakane/Math184A/>

Professor: Daniel Kane

Email: dakane “at” ucsd.edu

Office Hours: AP&M 7131, Tuesdays 12-2pm or by appointment.

TAs:

Jiaxi Nie Office hours: Thursdays 10-12 in AP&M 6414

Chengjie Huang Office hours: Fridays 2:55-3:55pm and 5-6pm in AP&M 6436

Shubham Sinha Office hours: Thursdays 3-5pm in AP&M 5412

Yaochen Wang Office hours: Mondays 5-7pm in AP&M 5218

Course Description: Math 184A 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, third edition.

Exams: There will be two in-class exams on April 27th, and May 25th in addition to a final exam from 3:00-6:00pm on June 14th.

Homework:

Submission Policy: Homework will be assigned due each week excepting the first week and weeks with exams. Homework should be submitted on gradescope and will be due by 11:59pm on Friday the week that it is due. *Homeworks turned in late will not be accepted.* 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. To get an account for the gradescope for this course (if one was not created for you automatically), use entry code 9KY4XB.

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 L^AT_EX or similar typesetting package is recommended (for those unfamiliar, there is a basic introduction to L^AT_EX on the course webpage at <http://cseweb.ucsd.edu/~dakane/Math184A/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.

Academic Integrity: Academic integrity will be taken very seriously by the course staff. Breaches of integrity may have broader consequences outside of the assignment in question. The following will all be 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.
- 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:	20%
Midterms:	$2 \times 20\%$
Final	40%

I will attempt to keep the grade distribution for this class similar to what it has been historically for Math 184A (though I may adjust this slightly if I am particularly impressed or disappointed with the class as a whole). That said, I often give very difficult exams, so you should not be worried by low exams scores unless the rest of the class did much better.

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)