MATH 579: Combinatorics

Spring 2026 Section 1: TuTh 12:30-1:45pm
in-person lecture modality   Meeting room: GMCS-405

Overview:

This course is an introduction to various methods of combinatorics, including the twelve-fold way, generating functions, recurrences, difference calculus, and Burnside's Lemma. Some problems involve proof, but the majority require careful and fully explained calculation.

Prerequisites:

Students are expected to be very comfortable with algebraic calculations, and at least somewhat comfortable with proofs. Math 245 and Math 254 are the course prerequisites.

Course Materials:

Everything you need will be in the coursepack provided, apart from the one-day section on Gosper calculations, which will require an internet connection.

Course Structure:

This course has in-person meetings twice weekly, all of which students must attend. These meetings will be split into a first half (approx. 30 mins), followed by a 5 minute break, followed by the remaining time (approx. 40 mins). The first half will consist of student presentations, while the second half will consist of students working in groups on the unit exercises, with the instructor offering help and guidance as needed.

Grading:

Unit exams, presentations, and the final exam, are all normalized to lie between 50% (blank but present) and 100% (perfect score). Missing grades are still worth 0%. The cutoffs for each letter grade are as below. The deadline for grade appeals is one week from when it's posted to Canvas.

What?	When?	Why?
Student Presentations	various	50
Attendance	throughout	50
Unit 1 Exam	Thu. Feb. 5	100
Unit 2 Exam	Thu. Mar. 19	100
Unit 3 Half-Exam	Thu. Apr. 16	50
Team Exam Score	various	50
Spring Break	Week of Mar.31, Apr.2	no class
Final Exam	Thu. May 7 10:30-12:30	200
Total		600

A: 552   A-: 540   B+: 528   B: 492   B-: 480   C+: 468
C: 432   C-: 420 lol   D+: 408   D: 372   F: 0

Attendance Scores:

Student attendance scores begin at 50/50 and can only decrease. Students may miss one class without penalty. After that, each unexcused absence incurs a 5 point penalty to participation. Coming late, leaving early, or being disengaged (e.g. on your phone) will also lead to penalties.

Teams:

Students will divide themselves into four teams, with whom they will work closely all semester. The end of the day on February 10 is the Team Adjustment Deadline. At this time your team will be locked in for the rest of the semester. Students have been pre-placed into Magenta Group, Plum Group, and Violet Group. All teams must include 1-2 people of each of these groups.

To encourage team collaboration, 50 points of your final grade will be the average of all the exam scores of everyone on your team (including you). The instructor will update this score after each exam to help you estimate your current grade.

Student Presentations:

The first half of each class will be filled with four student presentations – you will be presenting approximately six times during the semester. All presenters will write their solution on the board simultaneously (before class if possible), and will take turns discussing their solution and answering questions. They will sign up on the signup sheet provided (link in Canvas and in the Discord). Presentations are graded based on correctness as well as discussion accuracy. Your presentation grade is your average score on presentations, scaled up to 50 points.

Exams:

Exams are taken with no access to notes, calculators, phones, smartwatches, or other aids, apart from the coursepack which you will need. Unlimited paper will be provided. Most exam questions will be similar to the exercises. Unit 3 is shorter, so its exam will be shorter. The final exam will be similar to the unit exams in structure, except there will be extra emphasis on Unit 4 (which does not have its own unit exam).

Attendance:

Students are expected to attend every class, paying attention, participating, and taking notes as appropriate. Makeup exams are not given under any circumstances. Students who will miss class due to an official university event or activity (such as athletics), must notify the instructor during the first two weeks of classes. Absences for official university events must be documented with a memorandum from the event's sponsor with that same deadline. Students missing class due to a medical emergency must provide a signed medical excuse justifying the absence. Student Health Services does not provide these.

FERPA:

Student information in this course is confidential as required by law and by SDSU policy[1].

SDS:

If you are a student with a disability and believe you will need accommodations for this class, it is your responsibility to contact Student Disability Services at (619) 594-6473. To avoid any delay in the receipt of your accommodations, you should contact SASC as soon as possible. Please note that accommodations are not retroactive, and that accommodations based upon disability cannot be provided until you have presented your instructor with an accommodation letter from SASC.

[1]https://registrar.sdsu.edu/students/additional_resources_students/student_privacy_ferpa

Academic Integrity:

Students are strongly encouraged to study with their team, and to work together on exercises. Teams work best when everybody contributes. Don't sit passively – jump in there and take control of your education. Similarly, don't let others on your team sit passively – if they later bomb their exams, it will hurt both their grade and yours.

Use of AI to help with homework is discouraged but not forbidden – genAI is like a well-spoken but dumb friend, not a math expert. Trusting an AI solution without understanding is just as foolish as trusting a friend's solution without understanding.

Collaboration on exams is forbidden. Use of written, digital, or online resources during exams is forbidden, except for the coursepack. All violations will be reported to the Center for Student Rights and Responsibilities and will also result in grade reductions or worse. Courses failed due to integrity violations are ineligible for course forgiveness. See SDSU's full policy[2] on academic honesty, or ask the instructor, if you have any doubts or questions.

Do not distribute collections of solutions to people outside your team (hints, parts of problems, or even entire single problems from time to time, are all fine).

Additional Help:

The math department[3] maintains a list of paid tutors. Academic advising is available at the Student Success Center[4]. Counseling and Psychological Services[5] helps students with mental health concerns. The SDSU Economic Crisis Response Team[6] helps students with food/housing/financial concerns.

Learning Objectives:

Students will apply the techniques taught in this course to solve concrete problems and prove relevant theorems, carefully justifying or proving those answers, as appropriate. Students will articulate ideas and exhibit behaviors that cultivate teamwork, critical thought, and communication skills needed to function in a diverse workforce and global community.

Discord:

Please join the course Discord, you will likely find it quite helpful: `https://discord.gg/3gXW3HN7GA`

Professor:

Vadim Ponomarenko   `vponomarenko@sdsu.edu`
Drop-in office hours: Tuesdays and Thursdays 8:30-9:15am and 11am-12:15pm.
Also at other times by appointment. All office hourse held in GMCS 511
Website: `http://vadim.sdsu.edu/`

---

[2]`https://sacd.sdsu.edu/student-rights/academic-dishonesty/cheating-and-plagiarism`
[3]`https://math.sdsu.edu/`
[4]`https://cossuccess.sdsu.edu/academic-advising/`
[5]`https://sacd.sdsu.edu/cps`
[6]`http://sdsu.edu/ecrt`