MATH 245: Discrete Mathematics
Fall 2020 Section 1: MWF 10-10:50am
online lecture modality   Zoom link for all meetings:
`https://sdsu.zoom.us/j/2865540514`

Overview:
This course is a rigorous introduction to many of the tools useful in higher mathematics and computer science. The major topics to be covered will be logic and proof techniques. Also included will be a brief introduction to set theory, number theory, relations, functions, recurrences, and complexity.

This course is required for all students pursuing majors in computer science, computer engineering, mathematics, and statistics.

Prerequisites:
Students must meet *all* of these requirements to take the course. Students should read this list carefully, and if they do not or cannot meet a requirement must withdraw from the course immediately[1]. Failure to meet even one of these requirements will lead to failure in the course.

1. Attitude Prerequisite: This course is difficult, and has a 40% fail rate in the best of times. Students must take the course seriously. Taking a break, even for a few days, will make it almost impossible to recover. Don't be a statistic, keep up with the course. In case of problems, seek help immediately.

2. Time Prerequisite: Students must spend 10-20 hours per week on this course, every single week from the first to the last. This includes 3 hours of lecture, 1-2 hours of group meetings, 0-1 hours of office hours, and 5-15 hours of solving and writing up homework exercises.

3. Technology Prerequisite: Students must have suitable technology for two-way Zoom calls, including a working video camera (webcam or phone) and sufficiently high-speed internet connection[2]. They must also have a working still camera (webcam or phone) to take pictures of their handwritten work.

4. Use of Technology Prerequisite: Students must be capable of using the technology for this course. This includes joining and initiating Zoom calls, taking photographs, correct uploads of documents, checking email[3] for announcements, and taking online quizzes/tests through Canvas and Gradescope. Students must practice these skills on their own time, well before any deadlines. Unfamiliarity with the technology will not be accepted as an excuse.

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[1] All variances must be requested before the instructor adjustment deadline (1pm Sep. 2).

[2] Students who do not own such technology should contact SDSU's Economic Crisis Response Team (https://sa.sdsu.edu/ecrt) to ask for immediate help. This technology is necessary for the entire duration of the course.

[3] Note: Starting in Fall 2020, SDSU students will be contacted only through their official sdsu.edu email.

5. Attendance Prerequisite: This course meets on Zoom during its regularly scheduled times. Attendance is mandatory, and students must give their full attention to the course meetings for the duration. No recordings of lectures are permitted. Some assignments are due during classtime, while others are more flexible.

6. Subject Prerequisite: This course has as prerequisite a grade of C or better in Math 124 or 150 or 151; or a 4 or better on the Calculus AB exam; or a 3 or better on the Calculus BC exam. Students barely meeting the prerequisite (i.e. a grade of C/C+/B-) are at substantial risk of failing this course, and will likely need additional study time.

7. Textbook Prerequisite: Students must have a copy of *Mathematical Maturity via Discrete Mathematics*, ISBN 0-486-8357-9, for the duration of the course[4].

8. Writing Prerequisite: Students must write solutions to all of the exercises in the textbook (as well as all exam solutions), by hand, on paper[5].

9. Participation Prerequisite: Students must hold meetings with their study group at least weekly, either in-person or via Zoom. They must also participate and ask questions in office hours and in class.

10. Integrity Prerequisite: Students must understand and comply with the academic integrity standards in this course, and ask questions about any unclear issues. Unfamiliarity with the rules will not be accepted as an excuse.

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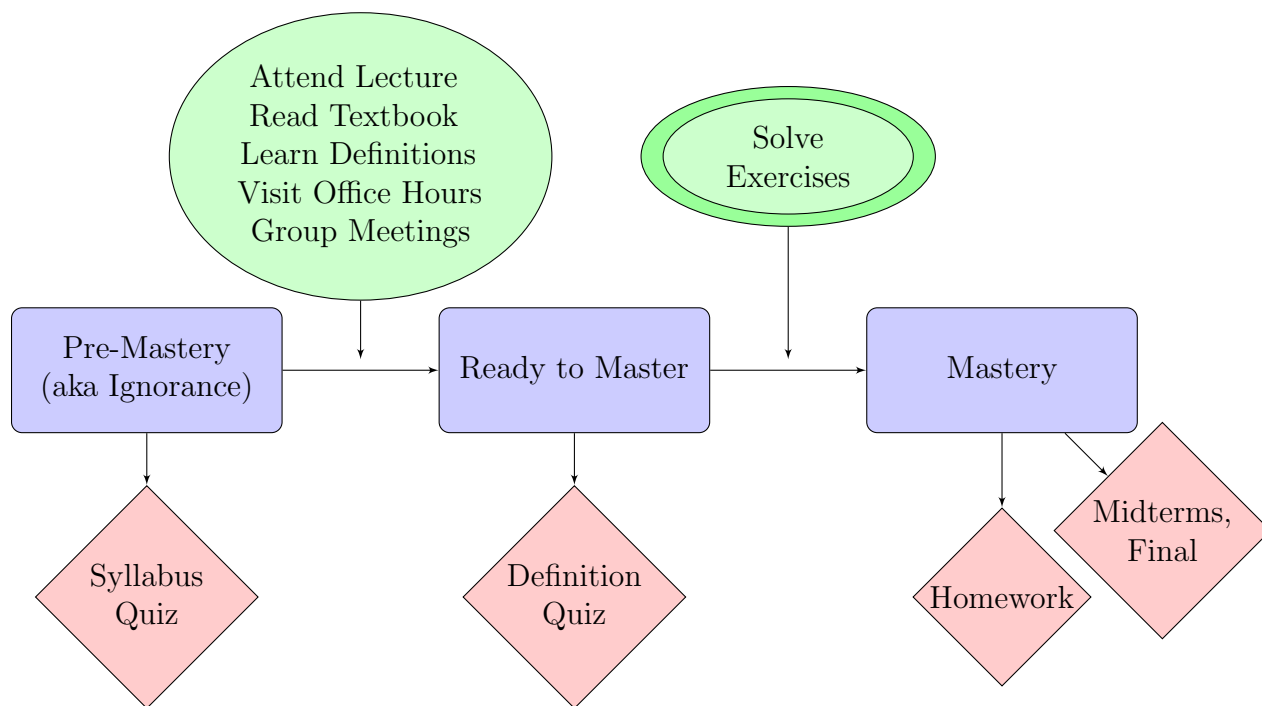
[4]Be sure to have the printed softcover Dover edition, not one of the old coursepacks of the same name.
[5]Students unable to write by hand due to physical limitations must seek accommodations through the SASC ASAP.

Course Structure:
This course has Zoom meetings three times per week, all of which students must attend. There are also office hours (both the instructor and the TA) which students must attend at least sometimes. Please set your zoom name to be your full name. Ask your questions through video – not the chatbox, and not audio-only.

Class meetings will contain an attendance check, during which students are expected to type "present" into the chatbox within two minutes of the start of the check. They will end with a definition quiz, on Canvas.

Students will be assigned into study groups, typically of size 4, and are expected to meet with their groups at least weekly to discuss homework solutions. Meetings must be face-to-face or via video chat (not text-based or audio-only).

Students are expected to produce solutions to all homework exercises, in their own handwriting, on paper (although they are welcome to get help with the ideas). Their homework will be collected at the end of each chapter (three class meetings).

Students will also take three midterm exams (during classtime) and a final exam (during finals week).

Grading:
Submitted short-answer grades (homework depth questions, midterms, final) are all normalized to lie between 50% (blank but present) and 100% (perfect score). Missing grades are still worth 0%. All other grades are the usual 0% to 100%, except participation which ranges from 80 points (maximum) down to -430. The cutoffs for each letter grade are as below. No other grades are awarded. A grade of C is considered passing for math/cs/ce majors.

What?	When?	Why?
Syllabus Quizzes	as announced	20
Participation	every lecture + others	80
Definition Quizzes	every lecture	200
Homework	once per chapter	200
Midterm 1 (Ch. 1-4)	Wed. Sep. 23	100
Midterm 2 (Ch. 5-7)	Fri. Oct. 16	100
Midterm 3 (Ch. 8-10)	Mon. Nov. 9	100
[Midterm 4 (Ch. 11-13) + Final]	Fri. Dec. 11 10:30-12:30	200
Total		1000

A: 900   B+: 880   B: 800   C+: 780   C: 700   D+: 680   D: 600   F: 0

Textbook:
Students are expected to own and read the textbook; it is inexpensive, very helpful, and brief. Students are expected to solve *all* of the problems in the text. Hints can be found in the back; solutions are not available, by design (see p. xxi for an explanation). Homework is generally not discussed in class due to time constraints – please bring homework questions to office hours, or ask via email. Students must write solutions to the problems by hand, in their own handwriting, on paper.

Attendance:
Students are expected to attend every class, paying attention and taking notes the entire time. Students who miss class, even occasionally, are at substantial risk of failing the course. Makeup quizzes and exams are not given under any circumstances. To ask questions, be sure to have your video and audio on, and raise your virtual hand. Be prepared for the attendance check – missing it will mark you "absent" and cost 10 participation points, while being late with it will mark you "late" and cost 5 participation points. One absence (or two tardies) will be automatically excused, per student, to account for the unexpected.

Students who will miss class due to a religious observance, or for 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.

Definition Quizzes:
On all class days except exam days, students take a 2 minute[6] quiz on a recent definition or theorem. Typically these are true-false, giving either 5 points (for a correct answer) or 0 points (for an incorrect answer). Since $39 \times 5 = 195$, students get an extra 5 points for free, to make 200. Students may use their textbook and notes during this quiz, but may not ask for help from other people. Makeup quizzes are not given under any circumstances.

Homework:
Students are expected to solve every exercise in the book. They are encouraged to seek help from the instructors, their study group, and the SDSU Math and Stats Learning Center. They are strongly *dis*couraged from seeking help from random online sources – these vary wildly in quality, and will often lead a student in the wrong direction.

All homework solutions must be written by hand, on paper. A change in handwriting style will be considered proof of academic misconduct[7]. Students will photograph their solutions and upload them at the end of each chapter. These will be graded for breadth (how many exercises were fully solved, even with errors) and depth (a selection of exercises will be carefully graded for correctness). Late homework will not be accepted. Homework grades will each be out of 15 points maximum. Since $13 \times 15 = 195$, students get an extra 5 points for free, to make 200.

Study Groups:
Study groups will be assigned by the instructor, at the beginning of the semester, based on initial student preferences as conveyed via Canvas survey. Students are expected to meet with their study groups at least once per week, to discuss homework. These meetings must be face-to-face or with video conferencing (not text-based or audio-only). Students need to keep track of their meeting times and attendance, and supply these when submitting homework. After each midterm, the instructor will assign new study groups, based on course performance as well as student preferences. This system tends to filter like-minded students into groups together. Free riders beware!

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[6]occasionally 3 minute

[7]If you suffer a hand injury or something similar, inform the instructor immediately.

Participation:
Students start with full credit, 80 points, in participation. Each absence from class during the two-minute participation checks will cost 10 points. Each tardy will cost 5 points. To account for the unexpected, two such class absences (or four such class tardies) will be forgiven. Students who do not meet with their study group before submitting their weekly homework will lose 10 points. One such group-meeting-failure will be forgiven.

Students are encouraged to ask meaningful mathematical questions from time to time during the semester. This must be either during class or office hours, and must be using video – not text or audio. Doing so will give 10 bonus participation points. These bonus points may be earned at most once during class, and once during office hours, per semester, per student.

Participation scores can go from 80 to below zero! Worst case will give a participation score of -430, giving a course grade of $570/1000$ (F) even with perfect scores on all quizzes, all three midterms, and final.

Exams:
The three midterm exams and final are all open book, open notes, with calculators permitted. No Respondus or other invasive measures will be employed. However, students are not permitted to seek help from anyone else during the exam periods, or use any online resource apart from Canvas and Gradescope. Sharing or discussing a question from an exam in progress, even without solution, is a serious violation of academic integrity, and will lead to automatic failure in the course (which cannot be fixed through course forgiveness).

The final exam will be roughly half on the last three chapters of material (like a fourth midterm) and roughly half cumulative (equally on all 13 chapters).

All exam questions are graded on a 50%-100% scale, with the total scaled to 50-100 points. No makeup exams will be offered under any circumstances.

Collaboration:
Students are strongly encouraged to study together, and to work together on exercises. However, collaboration on quizzes and exams is forbidden. Homework, although it may contain ideas from other sources, must be handwritten by the individual student. Impersonation of a student for participation/quiz/exam purposes is forbidden. Lying about group meetings is forbidden. Use of online resources (other than Canvas and Gradescope) during quizzes and exams is forbidden. 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[8] on academic honesty, or ask the instructor, if you have any doubts or questions.

Extra Credit:
Due to the large number of students and transition to online modality, no extra credit will be possible, apart from the bonus participation points described in the "participation" section above.

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[8]http://go.sdsu.edu/student_affairs/srr/cheating-plagiarism.aspx

Online Materials:
The professor maintains a comprehensive website (URL below). It contains old exams, solutions (most of which are correct), syllabi, course evaluations, grade distributions. Keep in mind that the textbook is new; past courses have been from an evolving coursepack. Their material may differ in places. The instructor is very diligent and prompt about responding to emails. The course is also active on Canvas (not Blackboard).

Learning Objectives:
Students will carefully state all definitions relevant to the course, apply these definitions to objects, and determine whether or not the definition applies. This determination will often involve a calculation. Students will have a ready supply of examples and non-examples to these definitions, and will be able to justify why these are examples or non-examples. Students will prove and disprove statements using the methods of discrete mathematics. They will construct rigorous proofs following the rules of logic. Students will carefully state and apply many mathematical theorems.

Additional Help:
The Math and Stats Learning Center[9] offers free drop-in tutoring in this course. Although the MSLC is open for many hours each week, Math 245-certified tutors are available at only certain times. The math department[10] maintains a list of paid tutors. Academic advising is available at the Student Success Center[11]. Counseling and Psychological Services[12] helps students with mental health concerns. The SDSU Economic Crisis Response Team[13] helps students with food/housing/financial concerns.

FERPA:
Student information in this course is confidential as required by law and by SDSU policy[14].

SASC:
If you are a student with a disability and believe you will need accommodations for this class, it is your responsibility to contact the Student Ability Success Center 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.

Professor:
Vadim Ponomarenko   vponomarenko@sdsu.edu
Office hours: MWF 9-9:50am, and by appt., at: https://sdsu.zoom.us/j/2865540514
Website: http://vadim.sdsu.edu/ (all old materials may be found here, under "teaching")

TA:
Joe McDonough   jmcdonough@sdsu.edu
Office hours: Mon 4-5:30, Tue 12-1:30, Fri 2-3:30, at: https://SDSU.zoom.us/j/342733582

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[9]mlc.sdsu.edu

[10]https://math.sdsu.edu/

[11]https://cossuccess.sdsu.edu/academic-advising/

[12]http://go.sdsu.edu/student_affairs/cps/therapist-consultation.aspx

[13]http://sdsu.edu/ecrt

[14]https://bfa.sdsu.edu/oerc/students/ferpa.aspx