MATH 245: Discrete Mathematics
Spring 2020 MWF 10-10:50am SSW-1500 face-to-face lecture modality

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 has as prerequisite a grade of C or better in Math 124 or 150 or 151. Students with less than a B in the prerequisite are at substantial risk of failing this course, and will likely need additional study time. This course is required for all students pursuing majors in computer science, computer engineering, mathematics, and statistics.

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.

Textbook:
Mathematical Maturity via Discrete Mathematics, ISBN 0-486-8357-9, is the required text. Be sure to have the printed softcover Dover edition, not one of the old coursepacks of the same name, which are full of errors.

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 not collected, and is generally not discussed in class due to time constraints – please bring homework questions to office hours, or ask via email. Students are strongly encouraged to form study groups to compare homework solutions.

Attendance:
Students are expected to attend every class, and are responsible for any missed material. Students who miss class, even occasionally, are at substantial risk of failing the course. Makeup quizzes and exams are not given under any circumstances.

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. Keep in mind that three quiz scores are dropped, to account for absences such as the above.

Quizzes:
On all class days except exam days, students take a 5 minute quiz on recent material. The purpose of these quizzes is to help students recognize whether or not they are keeping up with the basics of the course, rather than to assess deep and thorough understanding. Do not ignore this useful information! Ask for help immediately, should you start getting low quiz grades.

Students must complete these quizzes on $3'' \times 5''$ index cards, which they must bring. They must print their name, in the upper right corner, in a precise manner to be explained in class. Writing their name differently will cost a point on the quiz. All quizzes are closed book, closed notes, with no calculators or other aids permitted. Quizzes turned in (even blank ones) receive 5-10 points; quizzes not turned in receive 0 points. The three lowest quiz scores are dropped, to account for unexpected emergencies. Note that there are quizzes on the days before and after the exams; the latter is typically a second chance on one of the exam questions.

Exams:
The three midterm exams are closed book, closed notes, with no calculators or other aids permitted. Many questions are similar to homework questions. Definitions and named theorems are tested thoroughly. The final exam is similar, with two note cards permitted. The final exam is roughly 2/3 on material not covered on the previous exams, and roughly 1/3 cumulative (equally on all material). All exams are graded on a 50-100 scale. Seek help at once if you get an exam grade below 70 (C).

Course Mechanics:
The course proceeds at the pace of one chapter per week (three meetings) of class. Important dates:

Feb. 19: Exam 1 (Chaps. 1-4)   Mar. 13: Exam 2 (Chaps. 5-7)   Apr. 13: Exam 3 (Chaps. 8-10)
FINAL EXAM: Friday May 8 10:30am-12:30pm, in the usual classroom

Grading:
The daily quizzes (after dropping three) are worth a total of 10% of the course grade (approximately 0.3% each). The three midterm exams are worth 20% each, and the final exam is worth the remaining 30%. All grades are normalized to lie between 50% (blank but present) and 100% (perfect score). Missing grades are still worth 0%. The cutoffs for each letter grades are as follows. No other grades are awarded.

A: 90.0   B+: 88.0   B: 80.0   C+: 78.0   C: 70.0   D+: 68.0   D: 60.0   F: 0

Collaboration:
Students are strongly encouraged to study together, and to work together to solve exercises. Quizzes and exams must be taken without assistance, however. All violations will be reported to the Center for Student Rights and Responsibilites and will also result in grade reductions or worse. Don't jeopardize your entire college degree over a possible tiny benefit in one course. See `http://go.sdsu.edu/student_affairs/srr/cheating-plagiarism.aspx` for SDSU's full policy on academic honesty, or ask the instructor, if confused.

Extra Credit:
After each midterm, you are permitted to submit a revised solution to one of the ten problems (your choice). This is due at the start of the next class day. Your grade on this problem will become the average of the original and revised grades.

Extra credit must be submitted on a $3'' \times 5''$ index card, just as for your quizzes, with your name in the upper right corner as usual. Write the problem number (not the problem statement) in the upper left corner, and fit your solution on the front of the card only.

Online Materials:
The professor maintains a comprehensive website (URL below). Here you may find old exams, solutions (most of which are correct), syllabi, course evaluations, grade distributions. Keep in mind that the textbook is different every time, to various degrees. He is very diligent and prompt about responding to emails. If you wish to know your grade, please email anytime. However, there is *not* a Blackboard presence for this course, because Blackboard is evil.

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: GMCS 511, MWF 8:30-9:30am, and by appt.
Website: `http://vadim.sdsu.edu/` (all old materials may be found here, under "teaching")

TA:
Joe McDonough   `jmcdonough@sdsu.edu`
Office hours: Math Learning Center (in library) Th 2-3:30, F 12-1:30

Additional Help:
The Math Learning Center (`mlc.sdsu.edu`), located in the library, offers free drop-in tutoring in this course. Although the MLC is open for many hours each week, Math 245-certified tutors are available at only certain times. Call first. A list of paid tutors is available in the mathematics department office, GMCS 413. Academic advising is available at the Student Success Center (`https://cossuccess.sdsu.edu/academic-advising/`). Counseling and Psychological Services (`http://go.sdsu.edu/student_affairs/cps/therapist-consultation.aspx`) helps students with mental health concerns. The SDSU Economic Crisis Response Team (`http://sdsu.edu/ecrt`) helps students with food/housing/financial concerns.

FERPA:
All student information in this course is kept confidential as required by law and by SDSU policy. For details, see:
`https://bfa.sdsu.edu/oerc/students/ferpa.aspx`