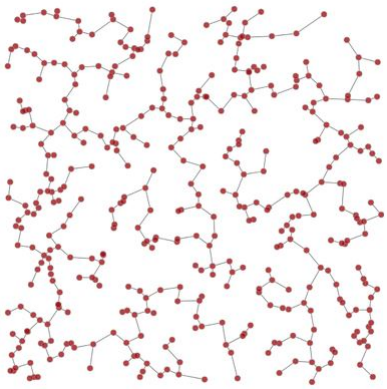
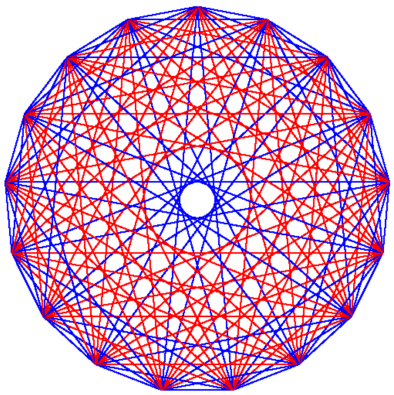
Fall 2020 MATH-UA 120: Discrete Mathematics, Section 4





Tuesday and Thursday, 8:55-10:45am EDT

Instructor: Vindya Bhat, vbhat@cims.nyu.edu
Office Hours: Tuesday, 4-5pm EDT and Friday, 9-10am EDT

Course Description

Topics included in this course are set theory, logic, algorithms, relations, functions, probability, number and graph theory. Discrete mathematics has many applications in computer science, operations research, chemistry, biology and the social sciences. We will study direct, contradiction, smallest counterexample, combinatorial and inductive proof techniques. An emphasis will be placed on developing "mathematical maturity", the ability to reason logically and effectively communicate mathematical arguments.

Minimum Prerequisites

SAT math score of 670, ACT/ACTE math score of 30, AB/BC score of 3, A/AS level maths score of C/B, IB HL/SL score of 5/6, MATH-UA 009 Algebra & Calculus grade of C, or placement exam.

Required Materials

1. Scheinerman, Edward R. (2013). Mathematics: A Discrete Introduction (3rd ed.). Boston, MA: Brooks/Cole, Cengage Learning.
2. Overleaf online LaTex editor account
3. Device(s) with functioning high-speed internet, scanner, speaker, microphone and web camera

A digital copy of [1] is available at a reduced rate through the Follett Access program, an NYU Bookstore initiative. The cost of the text is $28.50, a savings of $221.50 over the new hardcopy price, will be added as a "book charge" to your bursar bill. Go to https://includedcp.follett.com/2015 by February 12th to opt-out of this program. Student accounts for [2] are provided by a university-wide license. If you do not have the technology needed to learn and study remotely for this course, contact the Office of Student Success at studentsuccess@nyu.edu and a team member will be in touch to explore options.

Communication

The syllabus, calendar, slides, class notes, class meeting recordings, assignments, reading quizzes, exams, due dates, Google Jamboards, reading quiz and problem set solutions, grades and any course updates will be posted to our NYU Classes course site. Campuswire will be used as a forum for students and the instructor to discuss course topics outside of class meeting times.

Coursework

1. Students are expected to attend all class meetings on NYU Classes/Zoom. Live participation is encouraged to enrich class discussions and deepen understanding of course topics. Students participate by leading group work in breakout rooms and presenting proofs during class.
2. Outside of class meetings, students may participate by asking and answering questions posted to Campuswire, collaborating with classmates on reading quizzes and problem sets, attending office hours, forming study groups, completing ad hoc surveys and tutorials, etc.
3. Before most class meetings, students will read the text and submit their responses to a reading quiz posted to NYU Classes/Tests & Quizzes. Responses to reading quizzes are due on most Mondays and Wednesdays. Five reading quiz scores will be dropped from your course grade.
4. After most Tuesday class meetings, students will engage in peer review of a selected exercise posted to NYU Classes/Assignments. Your response will be due on Wednesday and your review will be due on Friday. Three peer review scores will be dropped from your course grade.
5. Problem sets by chapter will be posted to NYU Classes/Assignments. A final draft of your write-up must be submitted in PDF LaTeX. It should include thought process, calculations showing all work and citations of theorems and definitions used. The problem set for Chapter 1 will be individual. For all other problem sets, students will work in groups. Guidelines for groupwork on problem sets will be posted to NYU Classes/Resources. Problem sets will be due on selected Fridays. One problem set score will be dropped from your course grade.
6. Four exams will be administered by Smarter Proctoring via NYU Classes/Tests & Quizzes. Exams are scheduled for Tuesdays, March 2nd, March 30th and April 20th during class time. The fourth exam will be scheduled on a date and time during the final exam week by the registrar's office. An excused absence for an exam requires notification to the instructor before the exam starts, followed by valid documentation. Otherwise, you will receive a "0" for any missed exams. One exam score will be dropped from your course grade.
7. Students will maintain a portfolio to document their growth and learning in the course. The portfolio will include samples of your proof writing and reflective writing pieces. Each part of your portfolio must be submitted in PDF LaTeX on NYU Classes/Assignments on selected Fridays.
8. For the project, student groups will summarize and present history, definitions, theorem, examples and proof technique of a discrete math topic. The summary paper should be 4-5 pages in length and submitted in PDF LaTeX on NYU Classes/Assignments. The presentation should be no more than 5 minutes long, consist of slides prepared using the Beamer package in LaTeX, video recorded and posted to NYU VoiceThreads for classmates to view and comment. The summary paper and presentation are due on Monday, May 10th.

Assessment Plan

Numerical course scores will be computed using the weights shown:

Participation	5%	Peer Review	10%	Reading Quizzes	10%	Portfolio	10%
		Problem Sets	10%	Exams	45%	Project	10%

Letter grades will be distributed as shown:

A	A-	B+	B	B-	C+	C	C-	D	F
[100,93]	(93,90]	(90,87]	(87,83]	(83,80]	(80,77]	(77,73]	(73,70]	(70,60]	< 60

A curve may be applied to letter grades at the end of the semester depending on the course median.

Tentative Course Schedule

Day	Date	Topic	Reading
R	1/28	Introduction, Definition	§ 1-3
T	2/2	Theorem, Proof	§ 4,5
R	2/4	Counterexample, Boolean Algebra	§ 6,7
T	2/9	Lists, Factorial, Sets	§ 8-10
R	2/11	Set Equality, Quantifers	§ 10,11
T	2/16	Set Operations	§ 12
R	2/18	**Legislative Day - No Class**	
T	2/22	Combinatorial Proof	§ 13
R	2/24	Relations, Equivalence Relations	§ 14,15
T	3/2	**Exam 1**	
R	3/4	Partitions, Binomial Coefficients	§ 16,17
T	3/9	Contradiction	§ 20
R	3/11	Smallest Counterexample	§ 21
T	3/16	Induction	§ 22
R	3/18	Strong Induction	§ 22
T	3/23	Recurrence Relations	§ 23
R	3/25	Functions	§ 24
T	3/30	**Exam 2**	
R	4/1	Composition	§ 26
T	4/6	Pigeon Hole Principle, Sample Space, Events	§ 25,30,31
R	4/8	Conditional Probability, Independence	§ 30-32
T	4/13	Random Variables, Expectation	§ 33,34
R	4/15	Divisibility, GCD	§ 35,36
T	4/20	**Exam 3**	
R	4/22	Modular Arithmetic, CRT	§ 37,38
T	4/27	Graphs, Subgraphs	§ 47,48
R	4/29	Connectivity	§ 49
T	5/4	Trees	§ 50
R	5/6	Ramsey Theory	
	TBD	**Exam 4**	

Other Course Policies

Your safety and success in the course is important to me. For security purposes, students must join class meetings on NYU Classes/Zoom. All in-person meetings must meet current physical distancing and face covering guidelines. Students are expected to contribute to a positive learning community: arrive on time to class, turn cameras on during class time, participate meaningfully in class and learn from one another. I am available during office hours to discuss course material and by appointment to address personal matters. Peer tutoring is available to all students by the Math Department and University Learning Center. Students with disabilities should contact the Moses Center to make arrangements for academic accommodations as soon as practicable. In fairness to graders and other students, late coursework will not be accepted (no exceptions). All students must adhere to the NYU CAS academic integrity policy and honor code. Academic integrity is promoted by use of SmarterProctoring on exams and Turnitin on select assignments. Violators will receive a "0" score on the assessment and will be reported to the Dean's office for each offense. If you are in a situation that is adversly impacting your coursework, contact me and your academic advisor immediately so we can make a plan to move forward.