MATH-UA 120.004: DISCRETE MATHEMATICS
SYLLABUS - FALL 2017

Instructor: Thang Nguyen.
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Office: **WWH 619.**
Office Hours: **M 11 am :12 pm, T 6-7 pm or by appointments.**
Lecture: - MW 3:30 pm–5:20 pm at WAVE 367.
Course description: This course is a one-semester introduction to discrete mathematics with an emphasis on the understanding, composing, and critiquing of mathematical proofs. At the semester's conclusion, the successful student will be able to:

- Write clear mathematical statements using standard notation and terminology
- Understand and execute a variety of proof techniques (contradiction, induction, etc.).
- Show fluency in the language of basic set theory and Boolean logic
- Understand the basic theorems and their implications in a variety of (discrete) fields, including combinatorics, function, number theory, group theory, and graph theory.
- Explore other topics (as time permits).

The material we take up in this course is fundamental and introductory to various fields in mathematics. The techniques and methods we learn in the course will be repeatedly useful in mathematics and beyond.

Text book: Edward A. Scheinerman, Mathematics: A Discrete Introduction, 3rd Edition. (ISBN-13: 978-0840049421) You are strongly encouraged to have an easy access to the textbook. Our lectures will stay close and will often refer to portions of the textbook. You will be asked to read the book for topics that we do not have time to learn in detail in class.

Grading: The final grade will be computed with the following weights:

Homework	25%
Quizzes	20%
Midterm 1	15%
Midterm 2	15%
Final Exam	25%

A note on grades of W and I.

- Monday, September 18, 2017: Last day to drop spring classes and **not** receive a grade of "W".
- Monday, November 6, 2017: Last day to use the Term Withdrawal Form to submit a spring semester term withdrawal request or submit a request to withdraw from a course.

A grade of 'Incomplete' (I) is granted only in the rare circumstances that an emergency prevents a student in good standing from finishing the course in its last few weeks. As per the CAS Bulletin:

> "Students who are ill or have a serious personal problem should see, call, or write to an adviser in the College Advising Center, College of Arts and Science, New York University, Silver Center, 100 Washington Square East, Room 905, New York, NY 10003-6688; 212-998-8130."

NYU Classes: The main communication tool for this course will be the course Classes site, accessed through *newclasses.nyu.edu*. Assignments, grades, announcements, resources will be updated on this course site.

Homework: Weekly homework will be collected. The homework will be collected on Wednesdays and will be likely returned on Monday of the following week.

Quizzes: Short quizzes will be given every 1-2 weeks.

When calculating the homework and quiz grades for the semester, one of the lowest scores in each of these areas will be dropped. In fairness to all students and graders, **late homework will not be accepted.**

Midterm Exam: There will be **two in-class midterm exams** during the semester. See the attached schedule for the likely date.

Final Exam: The final exam will take place on **Wednesday, December 20, 2017. Time: 4:00-5:50 pm.**

Policy on out-of-sequence exams and missed quizzes

We are only able to accommodate a limited number of out-of-sequence exams due to limited availability of rooms and proctors. For this reason, we may approve out-of-sequence exams in the following cases, **documents are needed**:

- A documented medical excuse.
- A University sponsored event such as an athletic tournament, a play, or a musical performance. Athletic practices and rehearsals do not fall into this category. Please have your coach, conductor, or other faculty advisor contact your instructor.
- A religious holiday.
- Extreme hardship such as a family emergency.

We will **not** be able to accommodate out-of-sequence exams, quizzes, and finals for purposes of more convenient travel, including already purchased tickets. Please note again the date of the final and plan your summer travel accordingly.

Scheduled out-of-sequence exams and quizzes (those not arising from emergencies) must be taken before the actual exam. Make-ups must occur within one week of the regularly scheduled exam or quiz, otherwise a zero score will be given.

If you require additional accommodations as determined by the Center for Student Disabilities, please let your instructor know as soon as possible.

Technology: Technology can play an important role in the learning of mathematics, and as such, graphing and scientific calculators are permitted for class and homework, though they will not be required. Calculators will not be permitted on tests and quizzes, and thus it is emphasized that students learn not to rely on them.

Academic Honesty: Guidelines regarding cheating and plagiarism are laid out in the *http://cas.nyu.edu/page/academicintegrity* College of Arts and

Sciences guidelines and will be adhered to strictly. Collaboration is permitted, in fact encouraged, for home and class assignments; however, all submitted assignments must be written up independently and represent the student's own work and understanding.

Lecture plan: There are 28 lectures, which will likely distributed as the following page.

Week	Dates	Section	Topics	Quiz/Assignments Due
	09/04/17		**Labor day – no class**	
1	*09/06/17*	*3-4*	*Introduction; Definitions; Theorems*	
	09/11/17	*5-6*	*Proofs; Counterexamples;*	
2	*09/13/17*	*7*	*Boolean algebra*	*Homework 1*
	09/18/17	*8-9*	*List; Factorials*	*Quiz 1*
3	*09/20/17*	*10-12*	*Sets I and II*	*Homework 2*
	09/25/17	*11*	*Quantifiers*	
4	*09/27/17*	*13*	*Combinatorial Proofs*	*Homework 3*
	10/02/17	*14-15*	*Relations; Equivalence Relations*	*Quiz 2*
5	*10/04/17*	*17*	*Binomial Coefficients*	*Homework 4*
	10/09/17		**Fall Recess – no class**	
6	*10/11/17*	*18*	*Multisets; Review*	*Homework 5*
	10/16/17		**MIDTERM EXAM 1 (Sections 1-17)**	
7	*10/18/17*	*20*	*Contradiction*	
	10/23/17	*21*	*Well-Ordering Principle; Smallest Counterexample*	
8	*10/25/17*	*22*	*Induction*	*Homework 6*
	10/30/17	*24*	*Functions*	*Quiz 3*
9	*11/01/17*	*26*	*Composition*	*Homework 7*
	11/06/17	*27*	*Permutations*	
10	*11/08/17*	*35*	*Divisibility*	*Homework 8*
	11/13/17	*36*	*Greatest Common Divisor*	*Quiz 4*
11	*11/15/17*	*37*	*Modular Arithmetic; Review*	*Homework 9*
	11/20/17		**MIDTERM EXAM 2 (Sections 18-36)**	
12	**11/22/17**		**Thanksgiving break – no class**	
	11/27/17	*38*	*The Chinese Remainder Theorem*	
13	*11/29/17*	*39*	*Factoring*	*Homework 10*
	12/04/17	*40-42*	*Groups; Group isomorphism; Subgroups*	*Quiz 5*
14	*12/06/17*	*47-48*	*Graphs; Subgraphs*	*Homework 11*
	12/11/17	*50*	*Trees*	*Quiz 6*
15	*12/12/17*	*51*	*Eulerian Graphs*	
	12/13/17		*Reviews*	*Homework 12*
16	**12/20/17**		**FINAL EXAM (All Sections)**	

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