MATH 215: Discrete Mathematics
Fall 2017

Course Description

Humans have built a huge and important body of knowledge called mathematics. If you like thinking about infinity, neural networks, the Fibonacci sequence, or the shape of the universe, math has a place for you! A commonly agreed upon set of logical tools form the grammar of mathematics, and set theory gives us conversation starters. In this course we learn the grammar and start some conversations.

Our goals are the following

1. To develop skills needed in order to read, write, recognize and appreciate a (good) mathematical proof.
2. To develop fluency in using basic logic and set theory, including the language of functions and relations.
3. To gain familiarity with certain areas of mathematics which could be labeled as being "discrete" such as combinatorics and number theory.
4. To develop our own appreciation of some piece of mathematics.

Scheduled Lectures

Professor	(Section 1) Stanhope	(Section 2) Sullivan
Class Time	MTThF 12:50PM - 1:40 PM	MTThF 12:50PM - 1:40 PM
Class Location	John R. Howard Hall, Room 254	John R. Howard Hall, Room 243

Instructors

Professor	Liz Stanhope	Everett Sullivan
Office	302 BoDine	304 BoDine
Office Hours	M 1:40 - 2:40, T 10:00 - 11:00 and 1:40 - 3:40, W 1:40 - 3:40, and Th 10:00 - 11:00	T 2:00 - 4:00, Th 11:00 - 12:30, F 2:00 - 4:00
Office Phone	(503) 768-7727	(503) 768-7567
Email	stanhope@lclark.edu	esullivan@lclark.edu

Textbook

Discrete Matheamtics (and Other Stuff) by John Krussel. This text is available at the bookstore for $19.95.

Homework

There is an old saying that mathematics is not a spectator sport. The true test of whether you understand a mathematical topic is if you can solve problems, even if you are able to follow everything in the text and in class. At a deeper level, research in learning theory and in mathematics education suggests that working problems on your own is not just a convenient measure of your mastery of the material, but is actually a necessary step towards understanding.

This is the main reason why homework is assigned and collected in this course. There are also two secondary reasons why homework is assigned, collected, and graded, and why late homework is strongly discouraged. First, it gently forces you to keep up with the material. If one falls behind in a mathematics class, it is often very difficult to catch up. Secondly, the homework provides us with an easy way of telling whether the class and I are on track. If I find out a few days after covering a topic that most of the class is having trouble with it, we can easily go back and mend the problem; if I discover the same thing two weeks after covering the topic, we probably have a serious problem that is not easily remedied.

There are two types of homework assignments. The first is theory assignments which will be more conceptual and focus on proofs. Theory assignments will be assigned on Monday and due the following Monday at the SQRC by the end of the day. The second is practice assignments which will focus on understanding the day to day material. Practice assignments will be assigned on Monday and Thursday, and due the following Thursday and Monday at the SQRC by the end of the day respectively.

Your homework must be stapled and formatted as below. For proofs you must state the "Claim:" to be proven, indicate the start of your "Proof:", and use some symbol to mark the end of your proof to mark the end of your proof.

Name
Date
Homework #
List of assigned problems (e.g. 1.2: 1,3,14, etc...)

1. [Statement of Problem...]

    [Neatly written solution of exercise Or proof of statement...]

3. [Statement of Problem...]

    [Neatly written solution of exercise Or proof of statement...]

14. [Statement of Problem...]

    [Neatly written solution of exercise Or proof of statement...]

etc...

Exams

There will be three midterm exams and a final presentation. The exams are scheduled as follows:

Exam 1	September 22 12:50-1:40
Exam 2	October 23 12:50-1:40
Exam 3	November 17 12:50-1:40
Presentations	December 8, 11, and 12 12:50-1:40
Final	December 19 8:30-11:30

Grades

Your final letter grade for Math 215 will be based on the weighted total of the scores below. (Note that final grades are NOT based on fixed predetermined percentages.)

Class activity	Percentage of Grade
Homework (Practice)	15
Homework (Theory)	25
Exam 1	10
Exam 2	10
Exam 3	10
Presentation	10
Final	20

Academic Honesty

Academic integrity is at the core of our mission as mathematicians and educators, and we take it very seriously. We also believe in working and learning together.

Collaboration on homework is permitted and encouraged, but obviously it is a violation of the honor code for someone to provide the answers for you.

On written homework, you are encouraged to work together, and you may get help from others, but you must write up the answers yourself. If you are part of a group of students that produces an answer to a problem, you cannot then copy that group answer. You must write up the answer individually, in your own words.

On exams, you may not give or receive help from anyone. Exams in this course are closed book, and no notes, calculators or other electronic devices are not permitted.

Special Considerations

If you have a disability that may impact your academic performance, you may request accommodations by submitting documentation to the Student Support Services Office in Albany Quadrangle (x7191), and that office will notify me of the accommodations for which you are eligible.

SQRC

In addition to office hours, help is available at the Symbolic and Quantitative Resource Center (SQRC). The SQRC is on the ground floor of Howard Hall facing Watzek library.

Syllabus

The following is a tentative syllabus for the course and is subject to change.

Week	Day	Sections in Text	Brief Description
1	9/4		Labor Day, No Class
	9/5	1.1	Introduction and Basic Counting
	9/7	1.2	Permutations
	9/8	1.3	Combinations
2	9/11	1.4	Counting Overview
	9/12	3.1	Basic Logic
	9/14	3.2	Basic Logic
	9/15	3.3	Existential Quantifiers, Last day to drop
3	9/18	3.3	Proof Techniques
	9/19		Mathematical Statements
	9/21	2.0	Basic Number Theory
	9/22		Exam 1
4	9/25	2.1	The Division Algorithm
	9/26	2.1	The Division Algorithm
	9/28	2.2	The Division Algorithm
	9/29	2.3	Mathematical Induction
5	10/2	2.3	Mathematical Induction
	10/3	2.4	Greatest Common Divisor
	10/5	2.4	Greatest Common Divisor
	10/6	2.5	The Fundamental Theorem of Arithmetic
6	10/9	2.5	The Fundamental Theorem of Arithmetic
	10/10	2.6	Number Theory Review
	10/12	4.1	Set Theory
	10/13		Fall Break, No Class
7	10/16	4.1	Set Theory
	10/17	4.3	Set Theory
	10/19	6.1	Relations
	10/20	6.2	Equivalence Relations
8	10/23		Exam 2
	10/24	4.2	Cardinality
	10/26	4.2	Cardinality
	10/27	6.3	Functions

Week	Day	Sections in Text	Brief Description
9	10/30	6.3	Functions
	10/31	6.3	Functions
	11/2	6.3	Functions
	11/3	6.3	Functions
10	11/6	6.3	Functions
	11/7	6.5	The Pigeonhole Principle
	11/9	7.1	The Principle of Inclusion and Exclusion
	11/10	7.2	The Principle of Inclusion and Exclusion Last Day to Withdrawal
11	11/13	7.3	The Principle of Inclusion and Exclusion
	11/14	7.4	The Principle of Inclusion and Exclusion
	11/16		Review
	11/17		Exam 3
12	11/20	8.1	Graph Theory
	11/21	8.2	Graph Theory
	11/23		Thanksgiving break, No Class
	11/24		Thanksgiving break, No Class
13	11/27	8.3	Graph Theory
	11/28	8.5	Graph Theroy
	11/30		TBD
	12/1		TBD
14	12/4		TBD
	12/5		TBD
	12/7		TBD
	12/8		Presentations
15	12/11		Presentations
	12/12		Presentations, Last Day of Class
	12/18		Final Exam (8:30-11:30)