

Course Information
Math 176
Discrete Mathematics
Spring 2022

Finding me:

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Office hours: TBA, tentatively Mondays 1:30-2:15, Thursdays 1-3, and Fridays 12-1.

Learning Outcomes:

- (1) Students will become better at reasoning with and solving problems involving abstract ideas in a quantitative context. In particular, students will learn to:
 - Choose among multiple potential methods for solving a given problem.
 - Distinguish similar but distinct concepts from each other.
 - Apply known concepts and procedures to novel and unexpected situations.
 - Come up with intermediate steps of simple arguments
- (2) Students will learn to perform the following procedures and understand why these procedures produce correct answers:
 - Create truth tables for complex propositions.
 - Reduce logical statements to standard forms.
 - Determine the validity of a formal proof.
 - Perform basic operations on statements in predicate calculus
 - Perform basic operations on sets, functions, and relations.
 - Determine if a mathematical object satisfies a recursive definition.
 - Count the number of permutations and combinations of various types for various sets of objects.
 - Count elements of various sets using the Principle of Inclusion-Exclusion.
 - Calculate probability, expected value, and conditional probability on discrete sample spaces.
 - Write basic proofs using various techniques, including direct proof, proof by contradiction, mathematical induction, and the pigeonhole principle.
- (3) Students will understand and apply properly the concepts of logical equivalence, logical implication, quantifier, set, probability, expected value, function, relation, equivalence relation, recursion, permutation, combination, .
- (4) Students will communicate clearly, effectively, and in an organized fashion their solutions to problems, their reasoning, their understanding of concepts, and their understanding of procedures and their justification.

These outcomes will be assessed by homework and exams.

Textbook: David J. Hunter, *Essentials of Discrete Mathematics*, 3rd ed. ISBN 978-1-284-05624-2.

Class Fromat: We are scheduled to meet Mondays, Wednesdays, and Fridays at 2:30pm in TLC 29. Classes will be mostly lecture but there will be occasions for you to try an example on your own.

Attendance: You are expected to come to every class and participate.

SI-PASS: (Supplemental Instruction-Peer Assisted Study Sessions) Your SI-PASS leader is Mariano Estrada. He will hold group study sessions on Mondays 3:30-4:20, Tuesdays 4:00-4:50, and Wednesdays 6:00-6:50 in TLC 29 (our classroom).

SI-PASS are peer-led, group study sessions scheduled outside of class time. Mariano is a student who has previously done well in this course and been trained to help you succeed. He will facilitate the study sessions with a variety of activities aimed to help students master course content and develop effective study skills. These sessions are free and voluntary for all students. I am never told who attends, and Mariano has no input on grades. Students in the past have found these sessions helpful.

Grading: The course will be based on 800 points as follows:

Reading guides	20
Homework	130
Four midterm exams	100 each
Final exam	250

Translation of points to grades will be announced after each exam and will depend on the difficulty of the exams and the homework assigned so far. You should expect to need about 675 points for an A, 550 for a B, and 425 for a C, but actual numbers may be higher or lower. Note that 675 points is 82.5%, not 90%.

Final grade calculations will be done offline. I will report most of your grades on Canvas, but use what is written here, not Canvas, for estimating your grades.

Grades will be assigned with the numbers as a guide and not as a rule. The instructor reserves the right to adjust grades in both directions (though rarely downwards); these adjustments will be based on attendance, participation, use of office hours, and indications (beyond the numbers) about your understanding of the material.

Reading guides: You are expected to read the relevant sections from the textbook before each class. To help you focus on the important points in the reading, I will assign reading guide questions for each section on Bblearn, due at the beginning of class. Reading guides will be graded based only on completion. Any responses that indicate a reasonable attempt at understanding the reading will be given full credit.

Homework: Homework will be assigned most Fridays on Canvas and due the following Friday. Usually only some of the problems in the weekly homework will be graded. Please turn in homework on paper.

In addition, at the end of some classes, I will assign one problem which I will go over at the beginning of the next class. This will not be turned in or graded.

Students who attend class and participate have an automatic extension for homework (but *not* reading guides) until 5pm the same day, under my office door.

There will be more than 130 points for homework. At the end of the semester, your homework total will be scaled down to 130. (For example, if it turns out that there are

about 325 raw points available for homework, your homework raw score will be divided by 2.5 for final grade calculations.)

Exams: There will be four midterm exams in class on February 4, March 7, April 6, and April 29, and a cumulative final exam on Friday, May 13 at 3pm. You should let me know about any conflicts preventing you from taking an exam at the scheduled time at least one week in advance. Make-up exams will only be given for documented, important conflicts in accordance with the one week policy or for genuine documented emergencies. Except in the case of a documented emergency, missing the final exam without prior arrangement will result in a grade of F for the course.

Disability Accomodations: Students with disabilities (including temporary ones) needing accomodations to fully participate in this class should contact Center for Disability Access and Resources (CDAR). All accomodations must be approved through CDAR prior to being implemented. To learn more about the accomodation process, visit CDAR's website at <www.uidaho.edu/cdar> or call (208)-885-6307.

Plagiarism and Cheating: Work on exams should be entirely your own, with no help of any kind from any other source. (You may of course ask questions of the instructor or other proctor, but there is no guarantee you will get an answer.)

You are encouraged to discuss the homework problems with other students. You may also look up additional sources on the homework. However, you must write your notes on homework solutions independently. Excessive similarity in style and phrasing between the homework turned in by two students or between homework answers and a found source will be considered suspicious.

Tentative Schedule:

Date	Topics	Reading
Jan 12	Logic and Truth tables	1.1
14	Truth tables and logical equivalence	1.1
19	Propositional logic (equivalence and inference rules)	1.2
21	Disjunctive normal form	
24	Circuits	
26	Formal proof	1.2
28	Quantifiers	1.3
31	Negation of quantified statements	1.3
Feb 2	Review	
4	Mid-term 1	
7	Definitions and Axioms	1.4
9	Direct proof	1.5
11	Indirect proof	1.5
14	Graphs	2.1
16	Applications of graphs	2.1.3
18	Sets	2.2
23	Proving set identities and containments	2.2
25	Functions	2.3
28	Proving function injectivity and surjectivity	2.3
Mar 2	Function composition and inverses	2.3
4	Review	
7	Mid-term 2	
9	Relations	2.4
11	Euler paths	2.6
	Spring Break	
21	Equivalence relations	2.4
23	Partitions	2.4
25	Recursive formulas	3.1
28	Proving formulas by induction	3.2
30	Recursive definitions	3.3
Apr 1	More general induction proofs	3.4
4	Review	
6	Mid-term 3	
8	Basic counting, inclusion-exclusion	4.1
11	Permutations	4.2
13	Combinations	4.2
15	Combinations with repetition	4.2
18	Using functions to count	4.3
20	Discrete probability	4.4
22	Expected value	4.4
25	Conditional probability	4.4
27	Review	
29	Mid-term 4	
May 2	Catalan Numbers	
4	Review	
6	Review	