

Math 210

Discrete Mathematics

Fall 2022 Syllabus



MERCYHURST
UNIVERSITY

Course Information

Description

This course will include an introduction to a variety of topics, including sets, relations and functions, sequences and series, formal logic, counting arguments, graphs and trees, induction and recursion, and mathematical proofs. Emphasis will be placed on the language, notation, and communication of mathematics and its role in problem solving.

Objectives

In this course, you will:

- develop an understanding of mathematical language and notation;
- read, interpret, and construct mathematical proofs;
- define relations between sets of objects and the properties of those relations;
- learn the basic definitions and principles of logic, set theory, combinatorics, number theory, and graph theory;
- be exposed to several different areas of mathematics, via direct study or within examples designed to clarify other topics;
- learn to apply new techniques of problem solving in future courses.

Prerequisites

This course is intended for students pursuing a major or minor in mathematics or a related field such as data science. Calculus I and Linear Algebra, or instructor permission, are required.

Office Hours

Drop in with any questions or just to chat during the times shown at right - no appointment or notice required. If you need to meet with me outside those times, please email me to arrange a time. Zoom appointments on evenings and weekends are also possible with prior notice.

Section Information

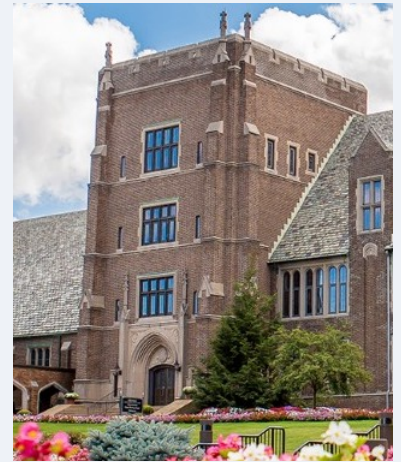
MWF 9 - 9:50

Hirt 103

3 Credits

Instructor

Lauren Williams, PhD
williams@mercyhurst.edu
(814) 824-2226
Old Main 404



Office Hours

Monday 10 - 11

Tuesday 9 - 11

Tuesday 1 - 1:50

Wednesday 10 - 11

Friday 10 - 11

and by appointment

Textbook

Applied Discrete Structures, 3rd Edition

by Al Doerr and Ken Levasseur

The authors of this text have made digital copies available for free, as a downloadable PDF as well as a website. Both are updated regularly.

PDF link:

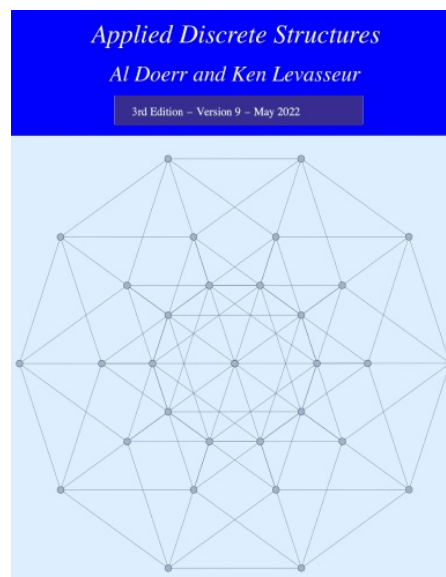
<http://discretemath.org/ads-latex/ads.pdf>

HTML link:

<https://discretemath.org/ads/index-ads.html>

To purchase printed copy (\$43):

<https://www.lulu.com/en/en/shop/al-doerr-and-ken-levasseur/applied-discrete-structures/paperback/product-125mzegz.html>



Grading

Homework 50%

- Assignments posted at end of each section
- Assignments may have different point values
- May include problems that will not be collected/graded
- All problems, included those not collected, may appear on exams
- Submitted via Blackboard assignment dropbox
- Extensions may be arranged *before* due date

Exams 50%

- Three unit exams of equal weight towards grade
- Lowest exam grade replaced by average of other two
- Will be based on assignments, including problems not collected
- Exams are not cumulative, within reason
- All exams will be given in person and closed book
- Make ups may be arranged *before* exam date

Mathematics Department Grading Scale

F	D	D+	C	C+	B	B+	A
0%	60%	67%	70%	77%	80%	87%	90%

Attendance and Make Up Policies

- Attendance is not required, but highly encouraged. You do not need to notify me of an absence *unless* you will be missing an exam.
- If you know ahead of time that you will not be able to attend class on the date of an exam, please make arrangements for an alternative time with me *before* that day.
- Make ups will generally need to be completed within two days. For an exam given on a Wednesday, you will need to complete the assessment by Friday evening. This will give me the opportunity to return graded work to the entire class promptly. Please see me if you have any extended absences due to illness or travel.

Tips for Success

- Attend class whenever possible. Attendance is not required nor part of your grade, but is instrumental in keeping up with material and remaining engaged in the class.
- Give it time. You're expected to spend approximately 9-12 hours per week on this course, *in addition* to class meetings. Some students will need to devote more time to the course than others. Mathematics is not a fast subject to learn, and requires a lot of practice. Try problems or reread notes every day, even if it's only for a few minutes.
- Skim through relevant sections in the textbook before the class lectures. This will help in your understanding of the lectures, and alert you to any topics you'll need to focus on while in class.
- Form a study group with other people in the class. You may not need to meet regularly, but work on arrangements (where/when/how) *before* you need to.
- Mathematics is naturally cumulative. When you're having trouble with a problem, try to determine exactly where you're having the problem and review earlier sections in the book as needed.
- Construct a reference sheet with definitions, important theorems, and useful formulas. Add to it throughout the semester, and keep it nearby when working on homework. Keep practicing until you no longer need your sheet.
- If you're stuck on homework problems or lecture material, come to office hours with questions. You should make an attempt to work on any problems on your own or with a classmate first. I will fully explain any problems that will not be collected as part of an assignment, and give suggestions for graded problems.

Academic Honesty

- Your grade in this class should be a reflection of your understanding of the material. Academic dishonesty is a disservice to your classmates, instructors, future employers and colleagues, and ultimately, yourself.
- You may not use any notes, textbooks, or electronic devices of any kind (calculator, phone, computer, smart watch, etc) on exams.
- You may help each other with homework, but try all problems on your own. All work for assignments should be included and distinct from your classmates.
- You can use online sources or books for clarification, but do not simply copy proofs or solutions to submitted problems.
- You may not use the work of another classmate, with or without their knowledge, on exams. This includes communicating during the assessment or simply copying from a nearby classmate.
- The first instance of academic dishonesty in this class will result in a grade of O on that exam or assignment. This O will not be dropped or replaced as a low or missed grade, meaning your final grade will be impacted.
- A second or further instance of academic dishonesty will result in a report to the University as well as an F in this course if you remain enrolled past the withdrawal deadline.

University Policies and Information

Food and Drink in the Classroom

In light of the COVID-19 situation, eating is not permitted in classrooms, labs, or other academic spaces. A water bottle or cup with a lid (and preferably a straw) is permitted to be used in classrooms and labs.

ADA

Mercyhurst University values inclusion and is committed to the goal of providing equal opportunities for all. Mercyhurst abides by federal, state, and local laws in admissions, employment, academic programs, and all services provided. Mercyhurst University is committed to complying with its obligations under the Americans with Disabilities Act (ADA), Section 504 of the Rehabilitation Act and the Fair Housing Act to ensure that a person with a disability is granted reasonable accommodations, when such accommodations are necessary, to afford that person equal opportunity to obtain a Mercyhurst education and use university facilities. Please refer to the HUB

<https://lakersmercyhurst.sharepoint.com/sites/StudentsHub>

and select the Services tab, then ADA Accommodations from the dropdown for instructions to request an accommodation. You may also contact Susan Reddinger, ADA Coordinator, ADA@mercyhurst.edu, 814-824-2362, Egan Hall 200. For students with questions about Academic Support, please refer to the HUB

<https://lakersmercyhurst.sharepoint.com/sites/StudentsHub>

and select the Academic Resources tab, then Academic Support for more information.

Title IX Information

Mercyhurst is committed to providing an environment free from sex discrimination, including sexual harassment and sexual violence. Please refer to the HUB:

<https://lakersmercyhurst.sharepoint.com/sites/StudentsHub>

and select the Resources tab, then Title IX - Sexual Respect from the dropdown for more information. If you would like to file a sexual misconduct complaint, please contact Ann Miller, Title IX Coordinator and Compliance Officer, titleix@mercyhurst.edu, 814-824-2363. Please be aware that in compliance with Title IX, educators must report incidents of sexual assault/harassment, stalking, and domestic/dating violence. If you disclose any of these situations in class, in papers, or to me personally, I am required to report it to the Title IX Coordinator (or any of the Deputy Title IX Coordinators).

Course Evaluations

Near the end of the semester, you will be asked to complete an online course evaluation. The evaluation will be completed in class during the last two weeks of the semester using any laptop, tablet, or mobile device. The response tool allows you to note aspects of the course that helped you learn, as well as aspects that might be modified to help future students learn more effectively. You will receive an email letting you know when the evaluation window for our class is open. Please note that these course evaluations are anonymous and instructors do not see the results until after the grades for the course are submitted.

Course Schedule

MONDAY	WEDNESDAY	FRIDAY
<i>No Class</i>	Aug 24 <i>First Class Meeting</i> Class Overview	Aug 26 Section 1.1 Set Notation and Relations
Aug 29 <i>Add-Drop Deadline</i> Section 1.2 Basic Set Operations	Aug 31 Section 1.3, 1.4 Cartesian Products, Binary Numbers	Sep 2 Section 1.5 Summation Notation
Sep 5 <i>No Class</i> Labor Day	Sep 7 Section 2.1 Basic Counting Techniques	Sep 9 Section 2.2 Permutations
Sep 12 Section 2.3 Partitions of Sets	Sep 14 Section 2.4 Combinations, Binomial Theorem	Sep 16 Section 3.1, 3.2 Propositions, Operators, Truth Tables
Sep 19 Section 3.3 Equivalence & Implication	Sep 21 Section 3.4 Laws of Logic	Sep 23 Section 3.5 Mathematical Systems & Proofs
Sep 26 Section 3.7 Mathematical Induction	Sep 28 Exam	Sep 30 Section 3.8 Quantifiers
Oct 3 Section 3.9 Methods of Proof	Oct 5 Section 3.9 Methods of Proof	Oct 7 Section 4.1 Proofs for Sets
Oct 10 Section 4.2 Laws of Set Theory	Oct 12 Section 5.1 Intro to Matrix Algebra	Oct 14 <i>No Class</i> Mid Semester Break
Oct 17 Section 5.2 Special Types of Matrices	Oct 19 Section 6.1 Relations, Basic Definitions	Oct 21 Section 6.2 Graphs of Relations
Oct 24 Section 6.3 Properties of Relations	Oct 26 Section 6.4 Matrices of Relations	Oct 28 Section 7.1 Functions, Definition and Notation
Oct 31 Section 7.2 Properties of Functions	Nov 2 Exam	Nov 4 Section 7.3 Function Composition
Nov 7 Section 8.1 The Many Faces of Recursion	Nov 9 Section 8.2 Sequences	Nov 11 <i>Pass-Fail Deadline</i> Section 8.3 Recurrence Relations
Nov 14 Section 8.4 Some Common Recurrence Relations	Nov 16 Section 9.1 Graphs, General Introduction	Nov 18 <i>Withdraw Deadline</i> Section 9.2 Data Structures for Graphs
Nov 21 Section 9.3 Connectivity	Nov 23 <i>No Class</i> Thanksgiving Break	Nov 25 <i>No Class</i> Thanksgiving Break
Nov 28 Section 9.4 Traversals on Graphs	Nov 30 Section 10.1 What is a Tree?	Dec 2 Section 10.2 Spanning Trees
Dec 5 Section 10.2 Spanning Trees	Dec 7 Section 11.1, 11.2 Algebraic Structures	Dec 9 <i>Last Class Meeting</i> Section 11.3 Properties of Groups
Dec 12 <i>Finals Week</i>	Dec 14 <i>Finals Week</i> Exam	Dec 16 <i>Finals Week</i>