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# MATHEMATICAL PROBLEM SOLVING

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Fall 2021 | Syllabus | Math 108

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## CLASS INFORMATION

### Professor

Lauren Williams, PhD

### Meeting Times

MWF 1:00 - 1:50

### Meeting Location

Hirt 305

## OFFICE HOURS

Monday 12 - 12:50 pm

Monday 4 - 5 pm

Tuesday 9 - 10 am

Tuesday 1 - 1:50 pm

Wednesday 12 - 12:50 pm

Friday 8 - 8:50 am

## CONTACT

### Email

lwilliams@mercyhurst.edu

### Office

Old Main 404

### Office Phone

(814) 824-2226

## COURSE DESCRIPTION

This course is intended to put the mathematical skills you already have to good use, and learn some new ones along the way. We'll see how mathematics can help us better understand the world around us. Most importantly, we'll understand how the strategies used to solve a specific problem can be expanded and used in a wide array of real life situations.

## COURSE OBJECTIVES

On successful completion of the course, students will be able to:

- Interpret and formulate problems in the language of mathematics
- Display mastery of basic computational skills
- Solve problems using essential principles from geometry, algebra, probability, and statistics
- Demonstrate the use of mathematical reasoning by justifying and generalizing patterns and relationships
- Demonstrate the use of basic mathematical processes and algorithms

## SUGGESTED MATERIALS

A textbook is not required for this course. However, the course will follow the topics of the textbook

Math in Society, by David Lipman, Edition 2.5

<http://www.opentextbookstore.com/mathinsociety/>

which is available as a free PDF, or as an inexpensive printed copy. If you are interested in a particular topic or would like more examples, please consider downloading the book or individual chapters.

## ASSIGNMENTS

Assignments will be posted on Blackboard regularly throughout the semester, typically every Friday. The assignments will be based on material covered in class the week prior. You will have one week to complete each assignment for full credit. Late assignments will be accepted with a 20% penalty for each week past the due date.

## GRADING

Your final grade for the course will be the average of the weekly homework assignments. Note that some assignments have a higher point value than others, so this will be a weighted average. Your current course grade will be visible in Blackboard throughout the semester.

F	D	C	C+	B	B+	A
0-59	60-69	70-78	79-82	83-89	90-92	93-100

## OTHER POLICIES

### Missed Class

You do not need to let me know if you'll have to miss class. Just make sure you keep up to date with the material on Blackboard, and get in touch with me if you have any questions.

### Email

I will attempt to respond to emails promptly. For your own protection, please use your Mercyhurst email address. Emails received after 6 pm may not receive a reply until the next business day. If you have not received a response from me in over 24 hours on a weekday, feel free to send another - I may have missed your first message.

### Extra Credit

Out of fairness to all students in the class, I do not give extra credit opportunities to improve your final grade.

### Academic Honesty

All students in this class are expected to maintain a high standard of academic integrity. Any instance of plagiarism or cheating will result in a 0 on the assignment or exam. A second incident will result in a submission of an academic dishonesty report to the university, and may result in an F in the course.

## COVID

### Masks

University policy requires all individuals to wear face coverings while indoors on campus. Masks are not required while sitting alone at your office desk or while eating.

### 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 to help prevent a student from becoming dehydrated. Masks should be pulled only slightly away from the bottom of the face to take a quick drink and immediately replaced to cover the mouth and nose.

## MATH 108 MATH PROBLEM SOLVING - FALL 2021 SEMESTER SCHEDULE

Week	Topic
1 Aug 25 - 27	<b>Course Introduction and A Bit of Geometry</b> Our first day will be an overview of the course expectations and topics. We'll also review some familiar but useful geometry that we'll need later.
2 Aug 30 - Sept 3	<b>Proportions and Percents</b> We'll see how to interpret statements about ratios and percentages, as well as develop a few general strategies for problem solving.
3 Sept 6 - 10	<b>Approximation</b> <span style="float: right;">No Class Monday</span> We don't always need an exact answer. This week, we'll look at how to quickly make rough estimates for a variety of problems, and decide if our solutions seem reasonable.
4 Sept 13 - 17	<b>Voting Theory</b> A look at the different types of ballots used in elections, and how mathematics can help ensure a fair election.
5 Sept 20 - 24	<b>Fair Division</b> What's the best way to divide a prize (or penalty) among several people, and who should decide? From rent to voting districts, we'll see how mathematics can be useful in keeping things fair.
6 Sept 27 - Oct 1	<b>Sets</b> A look at the mathematics behind sets and their operations, as well as their visualizations called Venn diagrams.
7 Oct 4 - 8	<b>Introduction to Logic</b> We'll see how mathematicians formalize arguments, and see how to identify (and avoid!) some common logical fallacies.
8 Oct 11 - 15	<b>Growth Models</b> <span style="float: right;">No Class Friday</span> A review of exponents and notation, and an overview of how exponential functions can be used to predict population growth, design musical instruments, and find the age of ancient artifacts.
9 Oct 18 - 22	<b>Personal Finance</b> Exponential functions will be revisited as we examine interest rates and loans to make better financial decisions.
10 Oct 25 - 29	<b>Graph Theory</b> Graphs are visualizations of relationships that can help us find patterns, paths, and efficient solutions. We'll look at the basics of graphs and circuits and how they are useful in the modern world.
11 Nov 1 - 5	<b>Number Systems, Old and New</b> A closer look at how we express our numbers, and how this simple yet important task has been carried out through the ages.
12 Nov 8 - 12	<b>Statistics: Collecting Data</b> We are living in the age of data, and frequently hear about new statistics. Understanding how the data is collected is the first step to making sense of these figures, and detecting potentially misleading statements.
13 Nov 15 - 19	<b>Statistics: Analyzing Data</b> In this second week on statistics, we'll look at some of the tools and techniques used to analyze data and how to interpret the statistics we see in the news.
14 Nov 22 - 26	<b>Introduction to Probability</b> <span style="float: right;">No Class Wednesday or Friday</span> The difference between permutations and combinations, and how to count them.
15 Nov 29 - Dec 3	<b>More on Probability</b> We'll see how to compute the likelihood of an event and exactly what is meant by "expected value".
16 Dec 6 - 10	<b>Game Theory</b> <span style="float: right;">No Class Friday</span> This will be a very brief introduction to an important use of logic and mathematics that business and consumers should know about.

## UNIVERSITY RESOURCES AND POLICIES

### ADA and Learning Differences

Mercyhurst University is committed to making reasonable accommodations for qualified students, and employees with disabilities as required by law. 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](mailto: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](mailto: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.

### Academic Honesty

Students are required to uphold academic integrity throughout the course. In particular, the use of unauthorized materials or collaboration on assignments or exams and other incidences of academic dishonesty will be handled according to the policies set forth in the Student Handbook.