

# MATH APPLICATIONS ART

Spring 2021 | Syllabus | Math 110-01

## CLASS INFORMATION

### Professor

Lauren Williams, PhD

### Meeting Times

MWF 9:00 - 9:50

### Meeting Location

Hirt 205

## ZOOM OFFICE HOURS

Monday 12 - 12:50  
Tuesday 9 - 10, 12 - 1:50  
Wednesday 12 - 12:50  
Thursday 9 - 10

## GET IN TOUCH

### Email

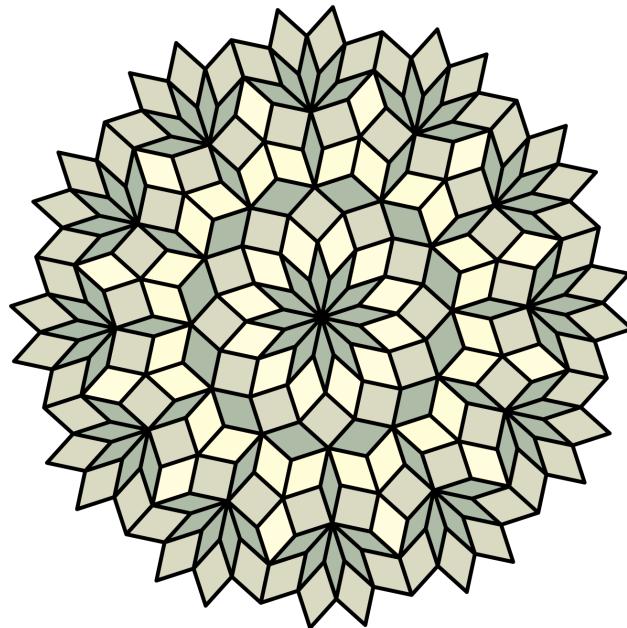
lwilliams@mercyhurst.edu

### Office

Old Main 404

### Office Phone

(814) 824-2226



## COURSE DESCRIPTION

This course is designed for anyone with an interest in mathematics, art, design, illustration, or programming. We'll take a look at a wide variety of topics in mathematics: symmetry, geometry, number systems, projections, knot theory, self-similarity, functions, spirals, and much more. Rather than cover each of these topics in depth, we'll focus on the fundamentals of each as applied to the creation of traditional art, music, digital art, architecture, and newly emerging techniques like computer generated art. If you're an artist, you might learn a few new tricks or inspiring ideas. However, our discussions will not end there. We'll also see how artists have contributed to mathematics, forming a close relationship between the fields of math and art that has lasted for thousands of years.

There are no prerequisites for this course. We'll review any mathematics you may need to know, and you'll likely find something to enjoy regardless of your mathematical or artistic background.

## COURSE OBJECTIVES

In this class, you will

- use the language of mathematics to describe objects, patterns, and structures,
- raise thoughtful questions about mathematics and its role in art,
- understand how to apply mathematical theories and concepts to create works of art,
- explore how artists have attempted to illustrate complex mathematical ideas in their work,
- solve basic algebraic problems and equations as related to the course.

## GRADING

### Topic Assignments

70%

Each week, you'll have a short assignment to complete on Blackboard that will help highlight the topics presented in class the previous week. For instance, Week 2 will be devoted to symmetry, so you'll need to complete the Symmetry assignment anytime during Week 3. There will be 14 of these assignments throughout the semester. Some assignments may be worth more than others. Your assignment grade will be the weighted average of all assignment grades.

### Project

25%

The topics we cover in class were chosen by your professor, but you should each have a chance to spend more time on what interests you! For your project, you'll be asked to create a "mini lecture" in the form of slides (PowerPoint, Keynote, etc). These slides will be posted to Blackboard where the rest of the class can learn from them. You will not be asked to present your work as a class talk or video, but you're more than welcome to do so! More information about the project can be found later in this syllabus.

### Discussion

5%

As part of your project, you'll be asked to pose at least two questions to your classmates that could generate discussion on your chosen topic. For the discussion portion of your grade, you'll be asked to respond to at least 3 of these prompts.

### Grade Scale

F	D	D+	C	C+	B	B+	A
0-59	60-69	67-69	70-76	77-79	80-86	87-89	90-100

## IMPORTANT DATES

### January

Jan 25: First Day of Class  
Jan 29: Last Day to Add/Drop

### February

Feb 17: Break, No Class

### March

Mar 15: Fake Wednesday  
Mar 16: Advising Day  
**Mar 26: Project Abstract Due**  
Mar 30: Fall Registration Open

### April

Apr 7: Break, No Class  
Apr 2: Last Day to Declare P/F  
Apr 9: Last Day to Withdraw  
**Apr 23: Projects Due**  
Apr 29: Break, No Class

### May

**May 4: Discussion Posts Due**  
May 6: Spring Classes End  
May 7: Reading Day  
May 10-13: Final Exams

## SEMESTER SCHEDULE

An updated schedule will be maintained on Blackboard in the case of any changes.

Week	Topic	M	W	F
<b>Week 1</b> Jan 25 - Jan 29	<b>Course Intro and Euclidean Geometry:</b> The history and significance of geometry, Euclid, and The Elements, along with some useful information about polygons.	N	B	A
<b>Week 2</b> Feb 1 - Feb 5	<b>Symmetry:</b> Recognizing types of symmetry, rigid motions, symmetry in science and nature	A	B	B
<b>Week 3</b> Feb 8 - Feb 12	<b>Tilings:</b> Polygons, creating tessellations of the plane, types of tilings, the tilings of MC Escher	A	B	A
<b>Week 4</b> Feb 15 - Feb 19	<b>More on Tilings:</b> Wallpaper patterns, Girih tilings and Islamic star patterns	A		B
<b>Week 5</b> Feb 22 - Feb 26	<b>Projections and Perspective:</b> Types of perspective, the mathematics of perspective, anamorphic art	A	B	A
<b>Week 6</b> Mar 1 - Mar 5	<b>Other Geometries:</b> Non-Euclidean geometry, symmetry and tilings on spheres, Escher and Coxeter	A	B	B
<b>Week 7</b> Mar 8 - Mar 12	<b>The Fourth Dimension:</b> Mathematical interpretations, Cubism, the fourth dimension in literature	A	B	A
<b>Week 8</b> Mar 15 - Mar 19	<b>Envelopes:</b> Tangent lines, creating envelopes, three dimensional envelopes, evolutes	A	B	B
<b>Week 9</b> Mar 22 - Mar 26	<b>Number Systems and Color:</b> A history of numbers, colors as numbers <b>Mar 26: Abstract Due</b>	A	B	A
<b>Week 10</b> Mar 29 - Apr 2	<b>More on Color:</b> Creating color palettes, transforming colors	A	B	B
<b>Week 11</b> Apr 5 - Apr 9	<b>Knots:</b> Mathematical knots and braids, history of knots in art, creating Celtic knots	A		A
<b>Week 12</b> Apr 12 - Apr 16	<b>Computer Generated Art:</b> Fractals, grammars, and randomness	A	B	B
<b>Week 13</b> Apr 19 - Apr 23	<b>Music:</b> Mathematics of sound, exponents and instruments, Bach the mathematician <b>Apr 23: Projects Due</b>	A	B	A
<b>Week 14</b> Apr 26 - Apr 30	<b>Spirals and The Golden Ratio:</b> Types of spirals and how to make them, the golden ratio in art	A	B	B
<b>Week 15</b> May 3 - May 5	<b>Course Recap and Gallery:</b> No new material here, just a chance to relax and look at some art <b>May 4: Discussions Due</b>	A	B	

## **TOPIC ASSIGNMENTS**

Each assignment will be made available on Friday at noon, and will be due the following Friday at midnight. Assignments may range in value; an assignment with only a few questions will have less weight than a more substantial assignment. Assignments will be a mix of multiple choice/short answer questions that will be completed on Blackboard, and/or a brief assignment that will let you practice a technique learned in class. You can expect to spend between 1 and 2 hours per week on assignments.

## **PROJECTS**

### **Topic**

Your topic is entirely up to you, but it should involve a connection between mathematics and art. You are encouraged to pick a topic that is not covered in our usual lectures, although some overlap is to be expected. If you're having trouble coming up with a topic for your project, there will be suggestions posted during the semester.

### **Abstract**

**Due March 26**

Before you begin working on your presentation, you'll be asked to submit an abstract. This should be a one paragraph description of your topic that will give the audience an idea of what to expect, and to make sure your topic is suitable. Your abstract will be reviewed and either accepted or rejected. If your abstract is accepted, you can get started on your presentation. If your abstract is rejected, you can resubmit as many times as necessary until it is accepted.

### **Presentation**

**Due April 23**

Your main project will be the creation of a slide show presentation on your chosen topic that will be shared with the class. The required components of the presentation are:

- 10-15 slides on your topic. A rubric will be provided, but you'll have plenty of flexibility to best showcase your topic.
- 3 or more references and/or suggested resources
- 2 or more discussion questions to pose to your classmates

Your slides should be in PDF, Power Point, or Google Slides format so they can be embedded and shared in Blackboard.

### **Discussion Posts**

**Due May 4**

After you've shared your work with the class, it's time for you to see what your classmates have to share with you! You'll be asked to reply to a minimum of three of the discussion prompts within your peer's presentations. A limit will be set on the number of responses to a particular presentation to make sure that all presentations get the attention they deserve.

## **REQUIRED MATERIALS**

There is no textbook required for this class. You will need regular access to Blackboard and a web camera to attend Zoom meetings. Some assignments may ask you to submit a photograph or scan of your work, so you should also have access to a digital camera (phone cameras are great). I may occasionally recommend free or inexpensive software/apps if you'd like to try them, but you will never be required to purchase any of these for the class. If you need any particular materials, please let me know!

## **UNIVERSITY RESOURCES AND POLICIES**

### **ADA Accommodations/Academic Support**

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 Sexual Misconduct/Sexual Harassment Reporting**

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 Dr. Laura Zirkle, Interim Title IX Coordinator and VP for Student Life, [titleix@mercyhurst.edu](mailto:titleix@mercyhurst.edu), 814-824-2362, Egan Hall 314. 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).

### **Academic Honesty**

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

### **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.

## **COVID-19 INFORMATION**

This is sure to be an unprecedented semester! While we cannot know what the next few months will bring, we must all work together to keep our campus community safe and healthy.

This page features information regarding policies of the University (in italics) as well as comments, suggestions, and requests that pertain to our class specifically.

### **A/B Meeting Schedule**

*As our class exceeds the maximum recommended capacity of our classroom under social distancing guidelines, we will be following the A/B schedule for our class meetings. This means that only half of you will attend in person classes each day, with the rest of you attending virtually through a live Zoom meeting. A schedule will be posted on Blackboard before the start of the semester indicating which group you're in and what days you should plan to come to the classroom.*

### **Face Masks**

*As per the COVID-19 Prevention, Mitigation, and Response Policy, Mercyhurst University is requiring that all members of the campus community wear a cloth or disposable face covering over their nose and mouth when on campus. Please refer to the policy for specific details as to where and when face coverings are required. Students may use their own face coverings or those provided by the University. A student in need of a face covering should email [covid19@mercyhurst.edu](mailto:covid19@mercyhurst.edu) or call 814-824-3600 to find the nearest location where face coverings are available. The University's Mask/Face Coverings Policy will be enforced in this class.*

### **Sanitation and Safety**

*In keeping with the COVID-19 Prevention, Mitigation, and Response Policy, students are expected to use hand sanitizer and to wipe down their desks using disinfectant wipes when they enter and exit the classroom. Classrooms have been provided with sanitizer and disinfectant wipes for student and faculty use.*

### **Eating and Drinking 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 straw preferably, is permitted to be used in classrooms and labs to help prevent a student from becoming uncomfortably parched. Masks should be pulled only slightly away from the bottom of the face to take a quick drink and immediately replaced to covering the mouth and nose.*

### **Class Dismissal and Congestion Prevention**

*In keeping with the COVID-19 Prevention, Mitigation, and Response Policy, faculty members and students should take steps to avoid crowding outside of classrooms, in hallways, and any enclosed area in university buildings. All rooms will be designated with signs indicating maximum capacity for specific instructional use. These must always be adhered to. Students waiting to enter classrooms or exiting classrooms should always maintain a minimum of 6 feet of distance from others. Class time endings may be adjusted when necessary to minimize overcrowding or congestion.*

## **COVID-19 INFORMATION, CONTINUED**

### **Seating Chart**

*In compliance with federal and state regulations, the University must be able to conduct contact tracing if there is a positive test or an outbreak; therefore, seating charts are mandatory for all in-person classes. Students will be required to sit in the same seat in the classroom each time they attend class. The seating chart will be available for review for purposes of contact tracing.*

### **Paper Sharing Policy**

We will not be exchanging paper this semester. Supplemental materials will be distributed and made available electronically. Assignments and exams will be submitted electronically as well. You are welcome to bring your own paper to class to take notes, but you may not pass paper to a classmate or to me.

### **Attendance and Missed Classes**

*Attendance at all classes is expected. However, it is important that students and course instructors adhere to the university's COVID-19 mitigation policies and strategies. As such, a student who misses class due to illness or suspected illness within the context of those policies will not be penalized and will be provided sufficient means to make up any missed course content or work and remain actively engaged in the class.*

The word "attendance" has a broader definition than usual this semester. While attending class is preferred, please do not feel obligated to come if you are feeling ill. You are free to join and participate in the live Zoom meeting in lieu of attending a class meeting, regardless of your A/B schedule. If you're not up to joining in, please watch the recording of the class meeting and the associated video lectures when you're able to.

If you are unable to attend class (or join the live Zoom meeting) for more than a few days, please let me know as soon as possible. I am happy to work with you in building a plan that allows you the time off you need without risking your academic progress.

### **Potential Class Changes**

It is my hope that we remain able to meet in person as scheduled for the entire semester. However, there is a very good chance that our plans will change, and without much notice.

If we are unable to continue meeting in person, you will still have the opportunity to "attend" class via Zoom during our regularly scheduled times. The course content on Blackboard was created to help fill in any unexpected gaps in meetings or attendance.

Our highest priority is to remain healthy and safe. We will all need to remain responsible, flexible, and understanding to make this semester a success, and I have full confidence that we will be able to achieve that goal.