Math 110 Math Applications Art

Course Information

Meeting Times
Tuesday, Thursday
2:00 - 3:15

Classroom
Zurn 207

Instructor
Lauren Williams, PhD

Email
lwilliams@mercyhurst.edu

Website
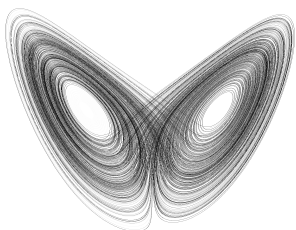math.mercyhurst.edu/~lwilliams

Office
Old Main 404

Office Phone
(814) 824-2226

Office Hours

Monday	1 - 1:50
Tuesday	9:30 - 11, 3:30 - 4
Wednesday	1 - 1:50
Thursday	9 - 10
Friday	1 - 1:50

Prerequisites
ALEKS score of 30 or higher

Course Description

Mathematics and art have had a deep connection for millennia, yet we too often see them as an opposition of rigor and creativity. In this course, we'll explore the many ways in which math and art have influenced each other, allowing both fields to reach new levels of beauty and meaning. The goal of the course will be to pursue a better understanding of both math and art, the process behind each, and the shared perspectives of mathematicians and artists. In each of our class meetings, we will discuss a different topic that showcases the connections between mathematics and art. For just some examples, will

- explain the impact of a mathematical understanding of linear perspective in art.
- discuss the use of symmetry and the golden section in works of art explore how artists have attempted to illustrate complex mathematical ideas in their work, leading to entirely new genres of art.
- review some of the different types of geometries, and how artists like MC Escher have visually described them.
- explore how ancient societies viewed mathematics, and its impact on their works of art.
- find examples of mathematics in fiction and film.
- explain how geometry is used to create large scale works, such as architecture, and how these methods have changed over time.
- view some examples of how computers can be used to create art based on mathematical algorithms.

Course Objectives

After completing the course, students will be able to

- use the language of mathematics to describe objects, patterns, and structures.
- raise thoughtful questions about mathematics and its role in art.
- apply mathematical theories, concepts, and understanding to create original art work.
- find connections between mathematics and the creative world.
- apply techniques in mathematics to create their own works of art.
- define basic mathematical terms and provide descriptions of the major fields of mathematics introduced in class.
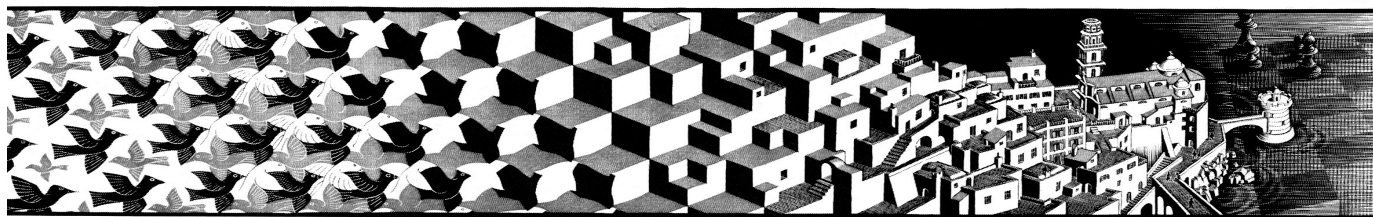
Important Dates

Aug	**24**	First Class Meeting
	28	Last Day to Add/Drop
Sep	**21**	Mass of the Holy Spirit
	28	Search for Symmetry
Oct	**12**	Mid-Semester Break
	21	Class Debate
	31	Advising Day
Nov	**17**	Last Day to Withdraw
	23	Thanksgiving Break
Dec	**7**	Last Class Meeting
	14	Final Exam 3:30 - 5:30
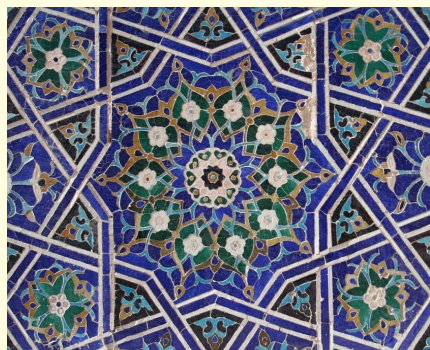
Basis of Final Grade

- 30%: Final Project
- 25%: Assignments
- 20%: Final Exam
- 15%: Class Debate
- 10%: Discussion Questions

Grading Scale

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

Assignments

Short assignments related to current class topics will be given throughout the semester. One assignment, to be completed early in the semester, will focus largely on concepts and definitions in mathematics that will be useful later in the course. Others will require searching for examples of mathematics and art in your surroundings, or responding to assigned readings. Late work will be accepted at a 10% per day penalty.

At least two assignments will require your participation in class on scheduled days. If you are unable to attend at those times, please let me know as soon as possible so alternate arrangements can be made. These days are noted on the attached schedule, though one activity is weather dependent and may need to be rescheduled.

Debate

In October, our class will be divided into teams. A formal debate will be held in an attempt to answer a few questions that have concerned mathematicians and artists alike for centuries: what and where is the fourth dimension, how can we describe it, and why would we want to find it?

Each team will be assigned a side for the debate. We will have a few class meetings devoted to the topic before the debate, but you will also be expected to consult additional sources and come prepared to argue your position. A more complete description of the process and expectations will be provided in class.

Discussion Questions

New insights and discoveries in mathematics or art would never come about without first posing a question. Unfortunately, we will not be able to cover every facet of mathematics and art in only one semester, but that does not mean we need to limit ourselves to the topics we see in class. To help fill in some of the gaps, and to encourage you to think about the material we do see beyond the basic facts, you will be required to submit two questions for discussion. These will be submitted via BlackBoard, and will be considered during the scheduled time in class.

Your questions should be focused on mathematics and/or its application to art, and should be open ended enough to allow for thoughtful discussion. For instance, rather than asking "How do I factor?" you might ask "Why is factoring useful?". Not every question will have an answer, but we will work as a class to consider the topic from the perspective of a mathematician.
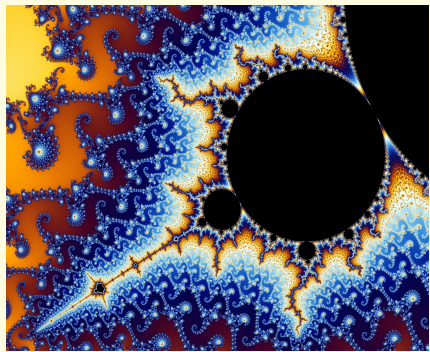
Learning Differences

In keeping with college policy, any student with a disability who needs academic accommodations must call Learning Differences Program secretary at 824-3017, to arrange a confidential appointment with the director of the Learning Differences Program during the first week of classes.

Mercy Mission

This course supports the mission of Mercyhurst University by creating students who are intellectually creative. Students will foster this creativity by: applying critical thinking and qualitative reasoning techniques to new disciplines; developing, analyzing, and synthesizing scientific ideas; and engaging in innovative problem solving strategies.
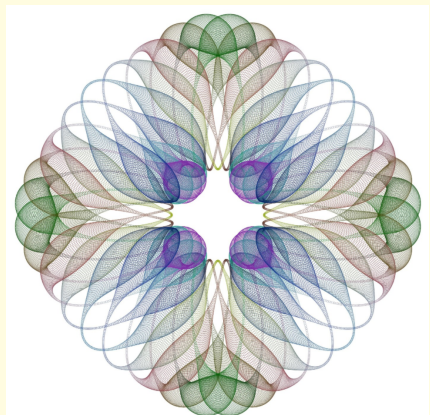
Final Project

The course will culminate with the presentation of a final project. You will be given the option of choosing one of two possible routes, each with its own set of requirements. No matter which option you choose, you will need to complete the following components:

1. Topic approval. Midway through the semester, you will need to submit a brief description of what you plan to do for your project. Approval of your "abstract" should be earned before you begin any real work. More information on this process will be provided in class.

2. Project advertisement. This will be a one page flyer designed to interest others in what you're working on. Creativity is encouraged.

3. Paper. If you are creating an original work of art for your project, you should plan to include a short paper describing the work and the application of mathematics. The research paper option requires a more in depth and lengthier paper, complete with sources.

4. Presentation. The final meetings of class will involve brief presentations, during which you will display and explain your original art or summarize your research paper.

Option 1: Create an original work of art
For this option, you will be expected to create an original work of art inspired by and/or using mathematics. The art work does not need to be based on a topic we've discussed in class - an entirely new idea is encouraged. You will also be required to submit a short paper (1-2 pages) explaining how mathematics was used in the creation of the piece. Do not feel limited to paper or canvas. Your artwork could be a sculpture, model, video, animation, or even performance.

Option 2: Research paper
If you are not feeling inspired to create your own work, this option will allow you to investigate an artist, mathematician, or artwork in depth. Your paper should be a minimum of five pages in length, with at least three relevant and appropriate sources consulted. The topic of the paper must incorporate mathematics and art. A paper about an artist should focus on how they have incorporated mathematics into their work, or how their work has a strong mathematical connection. Similarly, a paper that focuses on a mathematician should explain how their ideas have contributed to the arts.

More information about project expectations, including formatting and appropriate sources, will be given in class.

Final Exam

There will be a final exam for the class, largely focused on definitions and concepts that you will be well acquainted with by the end of the semester. More information, including a review guide, will be provided before the exam. The final exam is scheduled for Thursday, December 14, 3:30 - 5:30 pm.