Math Applications
Art
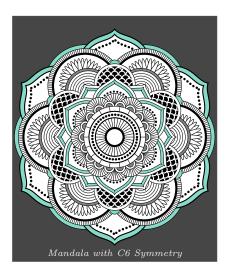## Fall 2018

Math 110-02
Tues Thurs
2:00 - 3:15 am
Hirt 209

Instructor

Dr. Lauren Williams

Old Main 404

lwilliams@mercyhurst.edu

(814) 824-2226

Mandala with C6 Symmetry

Office Hours

Monday 9:00 - 10:00

Tuesday 12:30 - 1:30

Wednesday 1:00 - 3:00

Thursday 8:00 - 9:00

Friday 1:00 - 2:00

and by appointment

Course Description

In this course, we will explore the connections between mathematics and art that have existed for millenia. While you may already know some ways in which math could be used to create visual art, it may be surprising to hear that the arts have had an even larger impact on the history and progress of mathematics. We will learn how to use mathematics to create visually appealing art, and learning to view the world around us from the perspective of a mathematician.

Course Objectives

On successful completion of 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,
- 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,
- solve basic algebraic problems and equations as related to the course,
- describe some examples of how computers can be used to create art based on mathematical algorithms.

Required Materials

This course does not require a textbook, software, or any other materials. Some homework assignments may require easily obtainable and inexpensive supplies, such as graph paper or markers. Please let me know if you need help obtaining or purchasing any materials to complete a project.

Course Website: http://math.mercyhurst.edu/~lwilliams/math110/Art/index.php

PREREQUISITES

There are no prerequisites for this course. This course satisfies the mathematics requirement of the REACH curriculum, but does not count as a prerequisite for any other mathematics courses.

HOMEWORK

Homework will be assigned regularly throughout the semester. Some of the assignments will reinforce the new mathematical concepts, definitions, and techniques you'll learn in class. Others will require you to apply mathematics to create artistic works. You are not expected to be an artist, though you are always encouraged to incorporate your own creativity into these assignments.

EXAMS

There will be two midterm exams given in class, and a final exam. These exams, including the final, are NOT cumulative and will focus only on the material covered since the previous exam:

- Exam I: October 2
  Basics of Euclidean geometry, perspective, and anamorphic art

- Exam II: November 1
  Number systems, matrices, linear transformations, color

- Exam III (Final Exam): December 13
  Higher dimensions, non-Euclidean geometries, symmetry, wallpaper groups

If you are unable to attend class when an exam is scheduled, please see me to arrange an alternate time *before* the exam is scheduled. Exams missed for unexcused reasons cannot be made up after the exam is given in class.

GRADING

| 300 POINTS | Exams |
| | Three exams, 100 points each |

| 200 POINTS | Homework |
| | Lowest quiz grade dropped |

| 500 POINTS | Total Possible |

GRADING SCALE

D	D+	C	C+	B	B+	A
300	330	350	380	400	430	450
60%	67%	70%	77%	80%	87%	90%

Other Course Information

- Attendance is not required, but is highly recommended. If you have to miss class, ask a classmate for notes and information you may have missed. I do not keep detailed lecture notes for this course.

- I will attempt to return emails as quickly as possible (within 24 hours). However, it is better to ask complicated questions during class or in office hours. If you have a question about the homework, it is quite likely someone else has the same question, so you're doing the entire class a favor by asking.

- I do not have a "no electronics" policy, but please remember to mute all devices during lecture, and use devices in a way that does not distract other students in the class.

- You will be allowed to listen to music (with headphones) during exams, but please keep the volume at a level that does not distract other students. Plan a playlist in advance - your phone/player will need to be kept face down on the desk throughout the exam.

- While you are encouraged to work together on the homework, be sure you understand all material on your own before an exam. You are expected to submit your own work unless otherwise specified by the assignment.

Learning Differences

Mercyhurst University is committed to making reasonable accommodations to assist individuals with disabilities in reaching their academic potential. Students with disabilities requiring accommodations should complete and submit this form:
https://www.mercyhurst.edu/sites/default/files/uploads/%3Cem%3EEdit%20Simple%3C/em%3E%20Student%20Consumer%20Information/accommodation_general.pdf
and the required documentation to the Director of Equal Opportunity Programs (DEOP), 300 Old Main, aagnew@mercyhurst.edu. Accommodations will not be granted prior to approval by the DEOP and will not be provided retroactively. Further information is available by visiting the Learning Differences website:
http://www.mercyhurst.edu/academics/learning-differences-program

Academic Honesty

Students are required to uphold academic integrity throughout the course. In particular, plagiarism of any sort, unauthorized collaboration on exams, quizzes and other 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.

Course Schedule

Aug	**23**	Class Introduction, What is Mathematics?
	28	*Elements* of Euclidean Geometry
	30	Polygons
Sep	**4**	Polyhedra
	6	Lines, Circles, and Curves
	11	Envelopes
	13	Projection
	18	Perspective
	20	Anamorphic Art
	25	Number Systems
	27	Representing Color
Oct	**2**	Exam I
	4	*No Class - Fall Break*
	9	Vectors and Matrices
	11	Vectors and Matrices
	16	Linear Transformations
	18	Linear Transformations
	23	*No Class - Advising Day*
	25	Transforming Colors
	30	3 Dimensional Transformations
Nov	**1**	Exam II
	6	Higher Dimensions
	8	Higher Dimensions
	13	Non-Euclidean Geometry
	15	Non-Euclidean Geometry
	20	Symmetry: Rigid Motions
	22	*No Class - Thanksgiving Break*
	27	Finite Symmetry Groups
	29	Wallpaper and Frieze Groups
Dec	**4**	Creating Tilings
	6	Wrap Up
	13	Final Exam 1:00 pm

Other Important Dates

August 27
Add/Drop Deadline

October 23
Advising Day

November 16
Withdrawal Deadline

November 23
Fibonacci Day

December 10
Reading Day

We will attempt to adhere to this schedule as closely as possible. Topics may be covered on other dates, but exams will be held as scheduled.

All changes to the course schedule will be announced in class.