

# Mathematics and Art Syllabus



## Math 160

**Teresa Downard & Dina Buric**

Spring 2019 - CRN 22008  
MT RF 12-1:20  
Miller Hall 113

Office Hours 11-12 am daily  
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### Course Description:

An investigation of the connections between mathematics, art and design with emphasis on mathematical inquiry and discovery. This problem solving course includes topics from a variety of mathematical disciplines such as: pattern and proportion, geometric constructions and proofs, symmetry and groups, polyhedra and origami, graphs and colorings, formal perspective, fractals and iterative processes, conics and curves.

### Course Outcomes:

- Develop problem solving skills and experience.
- Explore, imagine and create.
- Identify and analyze complex problems.
- Use quantitative and scientific reasoning to frame and solve problems.
- Work collaboratively and manage projects to effective completion.
- Demonstrate the ability to think through problems using words, symbols and pictures.
- Use mathematics to describe and untangle intricate relationships.
- Form logically sound arguments to justify conclusions.
- Cultivate an open mind that seeks patterns, connections, and answers to puzzling questions.
- Persevere through the ups and downs that are part of problem solving.
- Utilize creativity, intuition, and innovation to explore and express mathematical ideas.
- Accurately apply mathematical concepts to personal interests as well as more general real world applications.

## Course Materials:

Composition book

Writing utensils (5 colors)

Graph paper

Construction Paper

Scissors

Glue or tape

Compass and straightedge

Origami paper ( 60 sheets of the same size)

String (for string art)

Rope (for cutting and tying knots)

You are responsible for assembling these materials during the first week of class, and you're expected to bring the materials in the upper list everyday. Feel free to improvise/recycle/share materials.

## Grading:

The assessment of this course will consist of credit for in-class work documented in a Math Journal, readings, challenging take home problems, a group midterm and an individual final project. Grading is point based, to find your current grade in the course simply add up all the points you've earned and divide by the number of points possible.

Math Journal	5 points (daily)
Readings	1 point (daily)
Take Home Problems	3 points (daily)
Midterm Project	36 points
Final Project	60 points

At the end of the course you'll be assigned a letter grade using the scale below with a 3% plus/minus.

A: 90-100%    B: 80-89%    C: 70-79%    D: 60-69%    F: Below 60%

## Mathematics Journal

Every class day you'll receive a brief introduction to a topic then be given a challenging activity or problem to tackle as a class. You'll document your problem solving process in your composition book. This math journal should include enough information that a friend could understand your reasoning and needs to include both pictures and questions. You are expected to be engaged in the problem solving process for the whole class period, participate in group discussions, and share your results at the end of the class. If you are stuck or have completed the assigned problems, ask yourself some new questions and try to discover the answers to them. This is an experiential learning course, so if students miss class for any reason, they lose the points for that day. If you have a prolonged absence due to illness, a personal emergency, or a university-affiliated commitment, please contact me as soon as possible. The math journal is turned in every Friday for review.

## **Reading Reflections**

You'll have a reading assignment to prepare you for each class day. Readings will consist of articles from undergraduate mathematics journals, excerpts from textbooks, and other articles of interest and will be accessible online through the library. Before you come to class, write a paragraph-long reflection in your Math Journal about the reading.

## **Take Home Problems**

A couple problems will be posted on Canvas every class day that extend what we covered in class. Work on the problems every night and bring your ideas and questions to ask at the beginning of class. The problems for the week will be turned in loose-leaf paper every Monday. One problem from each day will be randomly chosen for grading on a scale of 0-3 points for attempting the problem, coming up with a sound strategy, and getting the correct answer. Special consideration is given for effort and innovation even if the final answer isn't reached, so be sure to show your work. You are encouraged to discuss the problems with your classmates and stop by my office hours regularly. Turn in your own work in your own words and no internet use is permitted unless explicitly stated in the question. Homework turned in late will be subject to a 25% penalty per class day.

## **Group Midterm Project**

The Midterm will include researching a question related to the course, using that information to discover/create something, and teaching the rest of the class what you learned in a presentation. All group members must contribute equally. To find ideas for topics, browse the books in our Course Reserves (accessible at the circulation desk in the library) and visit our library guide webpage <http://libguides.wvu.edu/Math160>. The proposal for the group midterm project is due by the beginning of the fourth week. Guidelines will be posted on Canvas.

## **Individual Final Project**

The Final will include researching a question related to the course in greater depth, using that information to discover/create something *new and original*, and communicating what was learned in a poster exhibit. The proposal for the final project is due by the beginning of the eighth week, and you'll be required to meet with me for a progress report. Final Projects will be exhibited in a public place (most likely the common area in Miller Hall) at our final exam time Tuesday, June 11 from 10-12. You are expected to be there the whole time and share information about your project with people in attendance, feel free to invite friends to see your work. Guidelines will be posted on Canvas.

## **Academic Integrity**

In this course it is essential to have academic integrity and not try to pass off other's ideas as your own. If you are using someone else's idea or content, be sure to cite your source. The process of problem solving is more important than getting the correct answer. Problems on the take home assignments that are too similar to another student's or content on the internet will receive 0 points and you must come to office hours to discuss the problems for any partial credit to be awarded. If it happens a second time it will be treated as academic dishonesty. Read and understand what academic integrity means at <http://www.wvu.edu/integrity/>.

### Tentative Schedule for MATH 160 - Mathematics and Art

The course is roughly chronological: we start with the ancients, go through the Renaissance, and into modern mathematics. Journals are turned in on Fridays and Take Home Problems on Mondays. Due dates related to the Midterm and Final Projects are shown in caps.

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Apr 1st	2nd <i>Number, Pattern</i>	3rd	4th	5th
8th <i>Geometric Constructions</i>	9th	10th	11th	12th
15th <i>Polygons &amp; Tessellations</i>	16th	17th	18th	19th
22nd <i>Conics, Curves &amp; Surfaces</i>	23rd MIDTERM PROPOSAL	24th	25th	26th
29th <i>Perspective &amp; Anamorphisms</i>	30th	May 1st	2nd	3rd
6th MIDTERM	7th PRESENTATIONS	8th	9th	10th
13th <i>Origami &amp; Graph Theory</i>	14th	15th	16th	17th
20th <i>Symmetry Groups</i>	21st FINAL PROPOSAL	22nd	23rd	24th
27th <b>Memorial Day</b>	28th <i>Topology &amp; Knots</i>	29th	30th	31st
June 3rd <i>Fractals</i>	4th PROGRESS REPORT	5th	6th	7th
10th	11th FINAL PROJECT EXHIBIT 10-12	12th	13th	14th