

MA 207 Visual Mathematics
Alabama School of Math and Science

Instructor: Sarah Brewer

Classroom/Office: S201

Web site: mathemartiste.com

Office Hours: Mon, Tue, Wed, Fri 10:00-10:55 (3rd per), Mon 3:45-4:40 (9th per), Tue 1:45-2:40 (7th per)

Math Lab (free tutoring): Sunday-Thursday 6:30-8:30pm in S305

Teaching Assistant: Valerie Flynn (Valerie.flynn@asms.net)

Spring 2019

Khan Academy Coach Code: HZKQG7FC

Turnitin.com Class ID: 20555937 **Enrollment Key:** vismath

Office Phone: 251.441.2127

Email: sbrewer@asms.net (best way to contact me)

Syllabus

Course Description: This hands-on course emphasizes visual problem solving and teaches students how to research and write about the intersection of mathematics and the visual arts. Topics vary by term and may include but are not limited to: fractal geometry, linear perspective, tiling and tessellations, symmetry groups, knot theory, modular origami, compass and straightedge constructions, and classification of surfaces.

Prerequisite: Precalculus.

Next in Sequence: This course fulfills the ASMS graduation requirement in Mathematics, though if you find these topics interesting, consider enrolling in Topology, Math History, Number Theory, and/or Problem Solving.

Texts:

Kinsey & Moore. *Symmetry, Shape and Space: An Introduction to Mathematics Through Geometry.*

Conway. *The Symmetries of Things.*

Abbott. *Flatland: A Romance of Many Dimensions.*

Cucker. *Manifold Mirrors: The Crossing Paths of the Arts and Mathematics.*

Frantz & Crannell. *Viewpoints: Mathematical Perspective and Fractal Geometry in Art.*

Sutton. *Ruler & Compass: Practical Geometric Constructions.*

Simon, Arnstein, and Gurkewitz. *Modular Origami Polyhedra.*

Grade Determination:

Assignment 1	Celtic Knots	20
Project 1	Celtic Knots	30
Assignment 2	Compass Construction	30
Project 2	Compass Construction	20
Short Paper 1	Knots and/or Compass Constructions	50
Assignment 3	Symmetry Groups	20
Project 3	Tessellations	30
Assignment 4	Perspective	20
Project 4	Perspective Drawing	30
Project 5	Origami	50
Quiz	Flatland	50
Assignment 5	3D Solids	50
Khan Academy Assignments		10
Team Presentation HW Assignments (10 points each)		100
Team Presentation 1		50
Team Presentation 2		50
Group Project		100
Final Paper		100

TOTAL POINTS

810

Projects:

Students will complete drawing- and sculpture-based mathematical constructions. The requirements of each project will vary depending on the topic. A final group project will integrate multiple areas of study.

Research:

Students will conduct academic research into specific areas of interest in the intersection of mathematics and the visual arts. Students will present their research to the class in several forms: written papers, video tutorials, and in-class presentations.

Academic Integrity:

Students and student work will be held to a very high standard in this course. If at any point I suspect that work you submit is not entirely your own, the matter will be brought to the disciplinary committee as per the Student Handbook Plagiarism policy, and you will receive a grade of zero for that assignment.

Tutoring: All students are encouraged to attend my weekly Office Hours and the evening student-run Math Lab for help with homework and projects.

Make-up policy: Any assignments missed due to unexcused absences will receive a grade of zero. Homework assigned during a student's absence must be turned in within three days of the student returning to class.

Cell phone policy: Phones should be SILENT or OFF (not on vibrate) and away. I reserve the right to confiscate any phone that I deem a distraction. Occasionally, we may use smartphone apps in class, but phones should remain away unless otherwise specified.

Attendance and Tardiness Policy: Three tardies count as one unexcused absence. A student with three unexcused absences may be assigned a grade of WF for the course. Students are responsible for acquiring any missed notes and assignments.

Tentative Topic Schedule

Week 1 – Feb 25 – Mar 01 (3/01 is short day)
2.2 Celtic Knots

BREAK – Mar 4-8

Week 2 – Mar 11-15
3.1-3.2 Compass Constructions & the Golden Ratio

Week 3 – Mar 18-22 (Jury Duty)
Geogebra; work on compass project & paper

Week 4 – Mar 25-29
4.1-4.2 – Regular & Semiregular Tilings;
Symmetry Groups & Tessellations

Week 5 – Apr 1-5
10.1 – Perspective

Week 6 – Apr 8-12 (4/10 is 2nd grade posting)
Origami

BREAK – Apr 15-19

Week 7 – Apr 22-26 (4/24 is ACT for Juniors)
6.1-2 – Flatland & the Fourth Dimension

Week 8 – Apr 29 – May 3
7.1,7.2,7.3 – Pyramids, Prisms, Antiprisms,
Platonic solids, Archimedean solids

Week 9 – May 6-10 (5/08 is 3rd grade posting)
Presentations

Week 10 – May 13-17 (5/17 is short day/last day of classes)
Presentations

FINAL EXAMS – May 20-22

MA 207: Visual Mathematics

Team Presentation Assignment

You will do two team presentations, selected from the following topics:

Pick one from this group:

From *Symmetry, Shape, and Space* text:

- 3.3 Theoretical Origami Bri & Janell
- 3.5 Linkages Will & Sophia
- 4.3 Penrose & other irregular tilings Shayne & Jim
- 9.1-9.2 - Spirals and helices, Fibonacci numbers & phylotaxis Fatema & Nane
- 12.1-12.2 Graphs & trees Greg & Sam

From *Manifold Mirrors* text:

- 8.2-8.3 The Geometry of Canons (music and math) Peter & Sam

Pick one from this group:

From *Viewpoints* text:

- Ch 8-9 Fractal geometry Nane & Jim

From *Symmetries of Things* text:

- Ch 4-5 Spherical and frieze patterns Janell & Will
- Ch 6-8 Euler characteristic and the classification of surfaces Frank & Shayne
- Ch 17-18 Hyperbolic groups Bri & Sophia

Using Murasugi/Adams texts in the library:

- Knot theory Peter & Frank

Using Stephenson text in the library:

- Circle packing Fatema & Greg

Format/Criteria:

Choice of:

- 7-minute content-dense instructional video OR
- 30-minute in-class lecture and demonstration

Both of the above choices must be followed by:

- An in-class Q&A session AND
- A short assignment that you will give and grade. This assignment must have clear criteria and instructions.

Sources must include:

- At least one of your course textbooks
- At least one other book, either an assigned text or from the ASMS library
- At least one scholarly peer-reviewed journal article acquired through JSTOR
- At least one article from the Bridges archives
- At least 4 sources total, not including image sources.

Sources cannot include:

- Non-scholarly internet sources
- Popular magazines

Deadlines:

- Choose topics by
- Meet with instructor by
- Powerpoint/video submitted by

Topic #1: Compass and straightedge constructions and/or the golden ratio (3.1-3.2)
 OR Regular & semiregular tilings (4.1-4.3)
 OR some combination of the two!

Find something within these topics that you find interesting and write about that.

Get specific; these topics are huge!

Format/criteria:

- 350-500 words, 12 pt Times New Roman, double-spaced, 1-inch margins
- Typed using LaTeX or Microsoft Word with equation editor (native to all recent versions of word)
- Follow Journal of Mathematic and the Arts guidelines for title page, citations, reference style, etc. Abstract is not necessary for papers this short.
- Include at least two images to support your research, properly cited.
- Sources must include:
 - At least one of your course textbooks
 - At least one other book, either an assigned text or from the ASMS library
 - At least one scholarly peer-reviewed journal article acquired through JSTOR
 - At least one article from the Bridges archives
 - At least 4 sources total, not including image sources.
- Sources cannot include:
 - Non-scholarly internet sources
 - Popular magazines

Deadlines:

- Topic and tentative bibliography by
- Outline and finalized bibliography by
- Rough draft with proper formatting by
- Final Paper submitted via turnitin.com by

Your topic must include one of the three topics you were assigned to present.

Even better: relate one of your topics to one or more of the other topics we have studied in some really cool way.

Format/criteria:

- Body of text should be 500-750 words, 12 pt Times New Roman, double-spaced, 1-inch margins
- Typed using LaTeX or Microsoft Word with equation editor (native to all recent versions of word)
- Follow Journal of Mathematics and the Arts guidelines for title page, citations, reference style, etc. Please do include a very brief abstract this time!
- Include at least three images to support your research, properly cited.
- Sources must include:
 - At least one of your course textbooks
 - At least one other book, either an assigned text or from the ASMS library
 - At least one scholarly peer-reviewed journal article acquired through JSTOR
 - At least one article from the Bridges archives
 - At least 5 sources total, not including image sources.
- Sources cannot include:
 - Non-scholarly internet sources
 - Popular magazines

Deadlines:

- Topic and tentative bibliography by
- Outline and finalized bibliography by
- Rough draft with proper formatting by
- Final Paper submitted via turnitin.com by

Return this page to Mrs. Brewer, signed, by Friday March 1, and place the rest of the syllabus in your notebook.

Student Name (print) _____

Read your syllabus in full if you have not already done so.

I have read the syllabus for Mrs. Brewer's Spring 2019 Visual Mathematics course and understand the expectations of the class. I will keep this syllabus in the front of my notebook and use it as a guide throughout the term. **I have signed this syllabus as a statement of accepting the challenges and responsibilities of this class in order to achieve my greatest academic potential.**

Student signature _____ Date _____

Create a Khan Academy account if you have not already done so. Log in and go to khanacademy.org/coaches (or click the "coaches" tab from your profile) and enter the coach code specific to this Visual Mathematics course.

I have logged into Khan Academy and added coach code. I have my log-in information written down somewhere safe so that I can easily recover it. I know to check Khan Academy daily for new assignments, which could take the form of videos to watch, articles to read, or exercises to work.

Student signature _____ Date _____

Create a Turnitin.com account if you do not already have one. Log in, click on "Enroll in a class" and enter the numeric class ID and case-sensitive password listed on your syllabus.

I have logged into Turnitin.com and enrolled in the correct class. I have my log-in information written down somewhere safe so that I can easily recover it. I know not to wait until the last minute to submit assignments using this platform, and instead will submit them early to take advantage of the excellent revision tools and tips this resource provides, including grammar and plagiarism checks.

Student signature _____ Date _____