

MATH 325: Classical and Modern Geometries
Spring 2004: Tues, Fri 2:30 - 3:50, ACW 205

Dr. Debra Borkovitz

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Office Hours: Wed 10-11, but also by appointment or just drop by. I will usually be available before and after class; I am generally at Wheelock all day on Tues, Wed, and Fri.

Course Goals:

- Learn challenging new material in geometry
- Strengthen ability to construct sound mathematical arguments
- Learn about important issues in the history of geometry
- Improve geometric intuition
- Improve oral and written communication skills in mathematics
- Improve problem solving skills
- Become proficient at using dynamic geometry software
- Approach geometry in multiple ways

Texts:

Henderson, David W., *Experiencing Geometry in Euclidean, Spherical, and Hyperbolic Spaces 2nd Edition*, Upper Saddle River, NJ: Prentice-Hall, 2001.

Abbot, Edwin A., *Flatland*, New York: Dover Publications, 1952. (note: only costs \$1.00, but also available free on line)

Euclid, *The Elements* (available free online).

Additional readings.

Physical Materials:

We will make use of many physical materials in class – zometools and other building manipulatives, beach balls and other spherical models, memo and origami paper, crocheted models of hyperbolic planes, etc. The materials you need to use outside of class will be inexpensive and readily available (e.g. memo cube paper, oranges or old tennis balls, rubber bands, etc.)

Technology: We will use Geometer's Sketchpad extensively; you need to have access to it outside of class. A student version of the software is available at the Longwood Coop; it will also be installed on some computers in the Wheelock Library basement computer lab; you can also use computers in ACW 205 when no one is in the room.

Blackboard Website: There is a website for this course at <http://www.courses.wheelock.edu>. In the first week of class, we will set up accounts so all students can access the site.

General Expectations/Prerequisites:

This is an advanced mathematics course at Wheelock, which means that the pace is a little faster than many other mathematics courses here, and that students are expected to struggle more with the material, outside of class. You will be expected to learn mathematics from the readings, as well as from the class activities. Of course, you are also expected to attend class, be on time, and participate (absences and lateness will negatively affect your grade).

There is no specific mathematical prerequisite, other than a willingness to explore new ideas and work hard.

Course Outline:

Please note that this outline is likely to change. Specific readings will be assigned in class. The number of classes per topic is approximate.

1. Introduction to Geometer's Sketchpad (3 classes)
Includes some paper folding and also some historical material.
2. Polyhedra (3 classes)
Read *Flatland* (or excerpts)
3. Henderson Chapters 1, 2, 3, and 5 (5 classes)
Review and Midterm (planned date for individual midterm is March 5)
Spring Break
4. Henderson parts of Chapters 6-10 (7 classes). Includes some historical material
5. Work on Projects (2 classes). Target week April 6 and 9, which are Passover and Good Friday; I am likely to be out of town on April 6; Emmanuel closes for Good Friday.
6. Negotiable (6 classes) – we will use some time for student-led activities. Also can decide what remaining topics to cover as a class.

General Note on Assessment:

This is a course in which the distinction between learning and assessment will be deliberately blurred. Some tests will include learning opportunities; in-class activities will be opportunities for assessment. Homework will generally be graded with comments and can be resubmitted, in response to comments (as long as work is done in a timely manner in good faith). The goal is learning.

Homework:

There will be homework after almost every class. Some homework will be collected. There may be some more formal assignments to help you practice mathematical communication.

Journals:

Approximately every two weeks, you will have a reflective journal assignment; some assignments will be specific, some more general.

Portfolio:

At the end of the semester, you will submit a portfolio showing how you have met the course goals. The portfolio will be an annotated selection of your homework assignments, journal entries, Geometer's Sketchpad work, and other work from the class.

Project:

The project is an important component of the class. You should begin thinking about project topics right away. You will receive a handout on project expectations and suggested topics near the beginning of the semester. All projects will involve learning new mathematics and will include both a written and oral component (usually teaching an activity).

Tests:

There will be a midterm and perhaps a final. The midterm will include two parts – a straightforward, individual quiz on the material, plus an oral group exam, with much more challenging problems. The oral group exam is an exciting way for you to learn new material without a teacher, as well as to demonstrate what you've learned in the class. The individual quiz provides accountability for each group member. The portfolio will be the major end of the semester project, but we might also have a final quiz.

Grading:

The proportions of the final grade are subject to change, especially as the actual assignments are subject to change, but here's a first approximation: in-class work – 10%, portfolio – 30% , project – 25% , midterm – 20%, final – 15%.

Useful Websites:

There is a more extensive list at the course web site:

Historical:

Interactive Euclid's Elements

<http://aleph0.clarku.edu/~djoyce/java/elements/elements.html>

Flatland

<http://downlode.org/etext/flatland/contents.html>

MacTutor History of Math Archives

<http://turnbull.mcs.st-and.ac.uk/~history/>

Applets

Spherical Sketchpad

<http://merganser.math.gvsu.edu/sketchpad/>

Non-Euclid

<http://www.cs.unm.edu/~joel/NonEuclid/>

Jeff Week's Geometry Games

<http://geometrygames.org/>

National Library of Virtual Manipulatives

<http://matti.usu.edu/nlvm/nav/vlibrary.html>

Geometry Forum Applets

<http://www.geom.uiuc.edu/apps/>

<http://www.geom.uiuc.edu/java/>

Other Geometry

Virtual Polyhedra

<http://www.georgehart.com/virtual-polyhedra/vp.html>

Origami

<http://www.merrimack.edu/~thull/OrigamiMath.html>

General

National Council of Teachers of Mathematics

<http://www.nctm.org>

Math World

<http://mathworld.wolfram.com/about.html>

Math Forum

<http://mathforum.org/>

Working Together/Academic Honesty:

You are strongly encouraged to work with other students both inside and outside of class, however, you must write-up your homework yourself. Cheating is of course unacceptable, and (as written in the college's Academic Honesty, Plagiarism and Assignment Submission policies in the College Catalog) can result in lowering of a grade, course failure, or dismissal from the college.

Disability Support Services:

If you have a disability and need accommodations, please notify me as soon as possible. You are also encouraged to contact Paul Hastings, Coordinator of Disability Services, at extension 2304. To receive academic accommodations at Wheelock College, you must be registered with the Disability Services Office. Paul can assist you in the process of determining appropriate accommodations.

***** Everything on this syllabus is subject to change *****

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