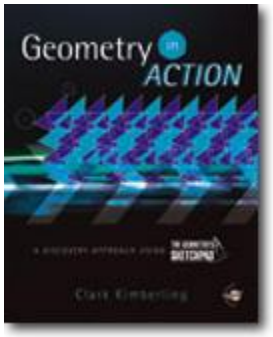

SDSU Math 510: Euclidean Geometry

With The Geometer's Sketchpad

Spring, 2010

Instructor

Dr. Janet Bowers

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Description of the course

This course is specifically targeted to prospective high school mathematics teachers. The importance of teaching geometry cannot be emphasized enough. According to the NCTM Standards,

> Geometry has long been regarded as the place in high school where students learn to prove geometric theorems. The Geometry Standard takes a broader view of the power of geometry by calling on students to analyze characteristics of geometric shapes and make mathematical arguments about the geometric relationship, as well as to use visualization, spatial reasoning, and geometric modeling to solve problems. Geometry is a natural area of mathematics for the development of students' reasoning and justification skills.

Course Objectives

Students will learn to:

1. Analyze the characteristics of geometric shapes and their relationships
2. Think about how analytic geometry links geometric and algebraic representations of various topics such as conic sections and trigonometry
3. Create proofs in Euclidean geometry (rather than memorize them) and develop an appreciation for the power of logical arguments to transcend empirical measurements, justify generalizations, and further mathematical exploration.
4. Use technology effectively as a teaching and learning tool for defining new mathematical objects and the role of proof in the explanation and construction process.

Topic Highlights

The course will cover all of the topics mentioned in the NCTM Standards for high school geometry as well as extensions in the following areas:
Geometry: Ceva's Theorem, Pascal's Theorem, Brianchon's Theorem, Euler's Line, the Nine-point circle, Morley's Theorem

Analytic Geometry: conic sections, centroids of polygons, trigonometry, polar coordinates.

Other Explorations may include:

- mathematical functions and music,
- geometric interpretation of completing the square,
- geometric interpretation of arithmetic, geometric and harmonic means
- geometric interpretation of Euclidean algorithm

Required Textbook & Software

Geometry *In Action* by Clark Kimberling. ISBN 1-931914-02-8
Geometer's Sketchpad (version 4.0 or version 5.0) software-student version

Weekly assignments

Each week, students will be expected to engage in five types of activities:

- ***Whole class discussions***

  Each week, I will introduce some of the concepts involved in the weekly unit. Students are encouraged to work together as a class to debate ideas for proving the various conjectures. Students are expected to participate in whole class and small group discussions.

- ***Computer Lab Sessions***

  The class will be held in the computer lab on most Thursdays. Students will be informed of the weekly schedule if things change, but a good deal of cooperative work using *The Geometer's Sketchpad* will be expected. Attendance to these sessions is mandatory, as is collaboration with others.

- ***Homework***

  Homework will involve constructions, proofs, and explanations assigned from the textbook. Constructions will be performed using the Geometer's Sketchpad and submitted via Blackboard. Some of these will be graded by instructor; others may be critiqued by classmates in the peer review process.

- ***Peer Review***

  The peer review process will involve developing and using a set of proof criteria to evaluate and augment each others' proofs, constructions, and explanations. This will be a double-blind process in which all names of submitters and reviewers will be anonymous. Failure to submit or critique proof assignments **by the posted deadlines** will be counted as a 0 for that homework grade.

Homework

- Each student will turn in his or her own constructions and proof files (please do not simply copy files), but collaboration during lab sessions is encouraged.
- Students are encouraged to ask for help from the instructor (during office hours, or by appointment via email)
- Homework will be graded on a sliding scale, depending on number of problems assigned.

- Late homework will be downgraded by 10% for every day late (even if you are absent, you can submit your homework via Blackboard, unless you have extraordinary circumstances, which will be handled on a person-by-person basis).

Assessment

Homework 25%
Test 1 (*Tentatively scheduled for Thursday, March 4)* 20%
Test 2 (*Tentatively scheduled for Thursday, April 15)* 20%
Final project 10%
Final Exam (Scheduled Thursday, May 20, 1300-1500) 25%

Grading Scale

93% – 100%	A	74% – 76%	C
90% – 92%	A-	70% – 73%	C-
87% – 89%	B+	67% – 69%	D+
84% – 86%	B	64% – 66%	D
80% – 83%	B-	60% – 63%	D-
77% – 79%	C+	59% or lower	F

Very Tentative Schedule:

Weeks 1-2: Special points in triangles
Weeks 3-4: Theorems about triangles and analytic geometric proofs
Weeks 5-8: Loci constructions and their relations to functions
Weeks 9-11: Trigonometry (Laws of sines and cosines, Heron's formula, etc.)
Weeks 12-14: Polar coordinates
Weeks 15-16: Project explorations