

Math 5200/7200 Fa 2007, Smith, 221 Boyd, MWF 12:20. Foundations of Geometry.
Books: Clemens and Clemens - Geometry for the Classroom;
Hartshorne, Geometry - Euclid and Beyond.

We will cover roughly the first 240 pages of Clemens/Clemens as review of basic Euclidean geometry theorems, with discussion of proofs. Then we will begin to examine more carefully the meaning of “proof”, and different approaches to axiomatizing Euclidean geometry, as in Hartshorne chapters 1 and 2, pointing out the variants known as neutral and non Euclidean geometry, obtained by omitting or changing some axioms. (It will turn out that if we do not allow Euclid’s famous 5th (parallel) postulate, then there may be no rectangles, and triangles may have angle sum less than 180 degrees.)

We will discuss Birkhoff’s approach via ruler and compass postulates, Hilbert’s synthetic approach, Euclid’s own (insufficiently postulated) approach allowing rigid motions (section 17 of Hartshorne), and the explicit approach assuming the Euclidean plane is given as the usual real coordinate plane \mathbb{R}^2 , as in Clemens. If time permits we will discuss some three dimensional geometry, such as volume formulas for spheres and cones (Clemens), and Dehn’s (negative) solution of Hilbert’s problem on the possibility finite congruent decomposition of polyhedra of equal volume (Hartshorne).

Students enrolled for credit in 7200 will give in - class presentations of some more advanced results in consultation with me, and will be expected to answer more difficult test questions, and to exhibit stronger test performances than those enrolled for 5200.

There will be three tests, roughly as follows:

Tests: I: 9/17; II: 10/17; III: 11/19. Final Exam: 12/12 noon.

Missed tests cannot be made up, and the final exam is not movable.

Since the number and dates of tests is subject to change, do not be absent near a test. In any event, attendance is expected and excessive absence may result in a W or WF.

The course grade will be at least a high as computed by: 15% HW, quizzes, presentations + 60% test average + 25% final exam. A= 90-100, B=80-89, C=70-79, D=60-69, F=<60.

This is a tentative plan for the course, changes may be necessary.

Please read the University honesty policy at at

http://www.uga.edu/ovpi/honesty/culture_honesty.htm