PRIMARY TEXTS. 1: Euclid. [on-line versions are fine. If you want print, I recommend the Green Lion Press version.] 2: Class Reader. 3. Various on-line sources
REQUIRED EQUIPMENT: A compass and a straightedge.
Geogebra. (free app.)

Evaluations and grade breakdown:
HOMEWORK AND CLASS PRESENTATIONS: 30 % (includes Platonic Solids).
MIDTERM: 30 %. BUT: You must have a passing midterm score in order to pass the course.
FINAL EXAMINATION: 40 %. [Monday, June 6 8:00?11:00 a.m.]

Calendar.
March 29. a Tuesday. 1st day of class.
April 21 (Th). Midterm.
May 7 (Mon). Platonic solids due
June 2 [Thursday] . last day of class.
June 8. Final. Monday, June 6 8:00?11:00 a.m.

OVERVIEW AND GOALS: This course is designed in part with the needs of future K-12 math teachers in mind but has plenty of material for future research mathematicians, and anyone with an interest in geometry. The student who passes this course will be able to teach a useful enjoyable high school geometry course in the spirit of Euclid, including compass-and-straightedge constructions, on-line tools, and know how to write an intelligible proof. This student will have a sense of the three basic homogeneous isotropic geometries; Euclidean, spherical, and hyperbolic, and their similarities and differences.

After the mid-term we jump into space. We build the Platonic solids as a route towards exploring spherical geometry and 3-dimensional Euclidean geometry. We introduce Klein’s Erlangen Program which put transformation groups at the forefront of geometry. (Transformations are now in the Common Core Curriculum.) Exploring and understanding transformation groups requires analytic geometry, linear algebra and some arithmetic with complex numbers. We will approach the hyperbolic plane thru models, beginning with the Minkowski space model in which the hyperbolic plane is the upper half of a hyperboloid of one sheet in three-dimensional Minkowski space. I aim to link this model to the upper half plane and disc model.

Other topics I aim to cover along the way include stereographic projection, billiards, tilings, and the endowing other topological spaces [flat torus, Mobius strip, projective plane, ...] with classical geometries.

CLASS STRUCTURE. Up to and including the midterm the class is a “boot camp” in Euclidean Geometry. You must pass the midterm to pass the course. After that it is a bit more traditional of a style. However, throughout the class is participatory. Some HW is assigned solely in class. Some HW is graded solely in class.