

Synopsis of new course Math 360:
Geometry for Elementary and Middle School Teachers

Overall Aim of Course: To equip teachers with a working knowledge of Classical Geometry, and to acquaint them with a variety of projects that could be undertaken in the classroom.

Topics to be covered:

- Euclidean plane geometry, including the geometry of parallel lines, triangles and circles. Some more advanced topics would be the nine-point circle, intersecting chords, orthogonal circles, transformations of the plane including inversion in a circle, symmetries of wallpaper patterns.
- Introduction to spherical and hyperbolic geometries; geodesics on a sphere and on the Poincaré disk; relation of angle sum of a triangle to area in the non-Euclidean setting; using inversions to generate tessellations of the Poincaré disk.
- Basic three-dimensional Euclidean geometry, including a study of polyhedra, in particular the five Platonic solids.

Methodology:

The style of the course will be that of a “workshop”, supported by a modest amount of lecturing from the blackboard. The best way, indeed probably the only way of assimilating mathematics effectively is to “do” it; thus a vital component of the parts of the course dealing with two-dimensional geometry will be the Windows software package *Geometer's Sketchpad* (<http://www.keypress.com/sketchpad>) designed specifically for K through 12 classroom activities and available in a Students' Edition for \$39.95. A large number of sample project worksheets and classroom activity modules are available. The activities related to polyhedra will be in part based on constructions with physical materials, but will also involve virtual constructions with the (free) rendering program Povray. Some sample images that I have used for teaching are viewable at <http://www.math.utk.edu/~morwen/3dsamples>.

Assessment: There will be no formal examinations in this course. Students will be assigned projects, and will give 20-minute presentations. Assessment will be based on these and general classroom participation.