

Mathematics 119: Ideas in Geometry
Syllabus for Instructors

Required Course Materials:

- Text: *Ideas in Geometry*, Math 119 Notes.
- A compass.

Course Description: A geometry course aimed at students who planning to teach mathematics at elementary and secondary education level. This course emphasis developing students' mathematical thinking, problem solving skills, and the ability to communicate mathematical ideas through topics chosen from geometry. This course satisfies the QRI requirement.

Prerequisite: Three years of high school mathematics, including two years of algebra and one year of geometry.

Couse Outline:

1. Set Theory: Properties of set, set operations, and application of Venn diagram.
2. Plane Geometry: Properties of lines, circles, parabola, angles, polygons, convexity, areas, Cavalieri's principle, tessellation, and selected theorem from classical plane geometry these included but not limited, Thales' theorem, Pythagorean Theorem, Pons Asinorum, Heron's Formula, etc.
3. Solid: Platonic solid, Archimedean solid, Euler's formula, nets, surface area and volume.
4. Construction Geometry: Compass and straight edge construction, Origami Construction, algebraic construction, constructible numbers, group and field theory.
5. Transformation Geometry: Affine transformation on number line, plane, and 3D space. Describe transformation using vector and matrices. Area preserving transformation and isometry transformation.
6. Non-Euclidean Geometry: Parallel postulate, spherical geometry, and taxicab geometry