Department: MATHEMATICAL SCIENCES   Semester Hours: 3

Course Title and Number: MATH 302 - Introduction to Geometry

Course Description: Basic concepts in plane and solid geometry, measurement, congruence and similarity, constructions, coordinate geometry, transformations and tessellations, topology, and selected topics. Not used in major or minor GPA calculations for mathematical sciences majors or minors. PRQ: MATH 229 or consent of department.

Course Objectives:

- To value mathematics and develop an ability to communicate mathematics, both in writing and orally.

- To gain the insight necessary to analyze the methods and models used to teach geometry in the elementary and middle school.

- To solve mathematical problems of a geometric nature.

- To appreciate geometry as a formal axiomatic system, and to verify propositions by formal and informal means.

- To understand concepts of measurement and geometric constructions.

Content:

- Introduction to geometry: basic concepts of plane and solid geometry; formal axioms.

- Measurement: use of standard and non-standard units; length, area and volume; the Pythagorean theorem.

- Congruence and similarity.

- Constructions: compass and straightedge; paper folding.

- Coordinate geometry: coordinates; slope; distance; linear equations; simultaneous equations; equations of circles.

- Transformations: translations; rotations; reflections; isometries; similitude; congruence.

Optional Topics:

- Tessellations and Escher-type patterns.

- Topology: topological equivalence; networks; the Jordan curve theorem; contiguous regions; the four-color problem.

- Introduction to geometric computer software.

Course Requirements: Class time includes group discussions and hands-on activities involving computers and manipulatives. Homework includes solving problems and typically a project relevant to the elementary and middle school curriculum. Laboratory experience and participation. Hour examinations and a final examination.

Assessment Instruments: Activity and homework outcomes. Judgment on student involvement and depth in discussions. Hour examinations. Final examination.

Selective Bibliography:

H. Blau, Notes (book in progress).