

## Math 443 Modern Geometries

### 1. Catalog Description

#### **MATH 443. Modern Geometries**

**4 units**

Prerequisite: MATH 442.

Non-Euclidean and projective geometries. Properties of parallels, biangles, Saccheri and Lambert quadrilaterals, angle-sum and area. Limiting curves: hyperbolic trigonometry, duality, perspectivity, quadrangles, fundamental theorems of projective geometry, conics. 4 lectures.

### 2. Required Background or Experience

Math 442 or equivalent.

### 3. Learning Objectives

The student should develop:

- a. Additional understanding of neutral and Euclidean geometry.
- b. An appreciation of Euclidean geometry as one of several possible geometries.
- c. A basic knowledge of the non-Euclidean geometries that include hyperbolic geometry, spherical geometry, and projective geometry.
- d. A basic knowledge of analytical and transformational geometry.

### 4. Text and References

- Greenberg, Marvin J., Euclidean and Non-Euclidean Geometries
- Reynolds, B., and W. Fenton, College Geometry Using the Geometer's Sketchpad
- Wallace, Edward C., and Stephen F. West, Roads to Geometry
- California Common Core State Standards – Mathematics Retrieve from <http://www.cde.ca.gov/ci/cc/>
- Standards for Mathematical Practice Retrieve from <http://www.corestandards.org/the-standards/mathematics/introduction/standards-for-mathematical-practice/>

### 5. Minimum Student Materials

Paper, pencils, notebook, compass, straightedge, and geometry dynamic software.

### 6. Minimum University Facilities

Classroom or lab with ample chalkboard space, overhead projector, and computers.

7. Content and Method

<u>Topic</u>	<u>Lectures</u>
a. Properties of hyperbolic geometry	12
b. Properties of spherical geometry	2
c. Properties of projective geometry	12
d. Properties of transformational geometry	<u>12</u>
Total	38

Method

Lecture and discussion, student-presented solutions of problems and demonstrations of theorems, and dynamic geometry software activities.

8. Methods of Assessment

Homework, quizzes, constructions, activities, oral presentations, and exams.