Math 443 Modern Geometries

1. Catalog Description

MATH 443 Modern Geometries (4)

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. Prerequisite: MATH 442.

2. Required Background or Experience

Math 442 or equivalent.

3. Learning Objectives

The student should develop:
- Additional understanding of neutral and Euclidean geometry.
- An appreciation of Euclidean geometry as one of several possible geometries.
- A basic knowledge of the non-Euclidean geometries that include hyperbolic geometry, spherical geometry, and projective geometry.
- 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

<table>
<thead>
<tr>
<th>Topic</th>
<th>Lectures</th>
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</thead>
<tbody>
<tr>
<td>Properties of hyperbolic geometry</td>
<td>12</td>
</tr>
<tr>
<td>Properties of spherical geometry</td>
<td>2</td>
</tr>
<tr>
<td>Properties of projective geometry</td>
<td>12</td>
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<tr>
<td>Properties of transformational geometry</td>
<td>12</td>
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<td>Total 38</td>
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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.