

MATH 329 Mathematics for Elementary Teaching III

1. Catalog Description

MATH 329 Mathematics for Elementary Teaching III

4 units

Prerequisite: MATH 328.

Introduction to rational and real numbers, probability and counting techniques, statistics, and geometry. Computer applications. 4 lectures..

2. Required Background or Experience

Successful completion of Math 328.

3. Learning Objectives

Mathematical Content

Students should:

- a. Be introduced to the axioms and undefined terms of Euclidean Geometry and complete basic constructions with compass and straightedge (potentially with technology), including, parallel lines, perpendicular lines, angles, segments, squares and equilateral triangles.
- b. Be able to draw, identify, and define a variety of common two- and three-dimensional objects.
- c. Understand attributes of two-dimensional objects (area, perimeter, sides, vertices) and three-dimensional objects (surface area, volume, edges, vertices, faces). This includes an understanding of the derivation of standard formulas by way of dissections as well as an understanding of common misconceptions associated with standard formulas.
- d. Understand notions of similarity and congruence including how similar figures relate in terms of area, surface area, perimeter, and volume.
- e. Understand linear and planar symmetries including translation, rotation, reflection, and glide reflection. This includes an ability to identify symmetries in a given object, to define the symmetries, and to implement the definitions with specific examples.
- f. Understand the Pythagorean Theorem and its converse as well as at least one proof of the theorem.
- g. Understand how to measure and estimate time, length, angles, perimeter, area, surface area, volume, weight, speed, and temperature in metric (SI), American, and nonstandard units. Students will be able to convert from one unit to another.
- h. Investigate the development of children's mathematical thinking.

Mathematical Understanding

Students should deepen their understanding of mathematics by:

- a. Participating in investigative experiences in mathematics.
- b. Developing multiple representations (physical, pictorial, and symbolic) for mathematical ideas.
- c. Explaining why mathematics makes sense by integrating the English language with conventional mathematical notation, mathematical definitions, and concrete representations.

- d. Writing and solving mathematical problems and exercises.
- e. Watching and analyzing video of K-8 students and teachers engaging with mathematics.
- f. Addressing their fears and apprehensions towards mathematics.

4. Text and References

- Sowder, J., Sowder, L. & Nickerson, S. Reconceptualizing Mathematics for Elementary School Teachers, W.H. Freeman and Co., New York, NY.

5. Minimum Student Materials

Required text, and activity materials provided by instructor.

6. Minimum University Facilities

Mathematics education classroom equipped with materials and technology.

7. Content and Method

| <u>Topic</u> | <u>Lecture/Activity</u> |
|--|-------------------------|
| Chapter 16: Polygons | 3 |
| 16.1 – Review of Polygon Vocabulary | |
| 16.2 – Organizing Shapes | |
| 16.3 – Triangles and Quadrilaterals | |
| Chapter 17: Polyhedra | 6 |
| 17.1 – Shoeboxes Have Faces and Nets! | |
| 17.2 – Introduction to Polyhedra | |
| 17.3 – Representing and Visualizing Polyhedra | |
| 17.4 – Congruent Polyhedra | |
| 17.5 – Some Special Polyhedra | |
| Chapter 18: Symmetry | 3 |
| 18.1 – Symmetry of Shapes in the Plane | |
| 18.2 – Symmetry of Polyhedra | |
| Chapter 19: Tessellations | 2 |
| 19.1 – Tessellating the Plane | |
| 19.2 – Tessellating Space | |
| Chapter 20: Similarity | 3 |
| 20.1 – Similarity and Dilations in Planar Figures | |
| 20.2 – More About Similar Figures | |
| 20.3 – Similarity in Space Figures | |
| Chapter 21: Curves, Constructions and Curved Surfaces | 3 |

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| 21.1 – Planar Curves and Constructions | |
| 21.2 – Curved Surfaces | |
| Chapter 22: Transformation Geometry | 5 |
| 22.1 - Some Types of Rigid Motions | |
| 22.2 - Finding Images for Rigid Motions | |
| 22.3 - A Closer Look at Rigid Motions | |
| 22.4 - Composition of Rigid Motions | |
| Chapter 23: Measurement Basics | 3 |
| 23.1 - Key Ideas of Measurement | |
| 23.2 - Length and Angle Size | |
| 23.3 - Issues for Learning: Measurement of Length and Angle | |
| Chapter 24: Area, Surface Area, and Volume | 3 |
| 24.1 Area and Surface Area | |
| 24.2 Volume | |
| 24.3 Issues for Learning: Measurement of Area and Volume | |
| Chapter 25: Counting Unites Fast: Measurement Formulas | 2 |
| 25.1 - Circumference, Area, and Surface Area Formulas | |
| 25.2 - Volume Formulas | |
| Chapter 26: Special Topics in Measurement | 2 |
| 26.1: The Pythagorean Theorem | |
| | Total |
| | 35 |

Method

Lecture, discussion, activity.

8. Methods of Assessment

Class activities, homework and lab assignments, term projects, midterm tests or quizzes, final examination.