

**Mathematics 3323**  
**Exploring Middle School Mathematics**

**Student Learning Outcomes**

- 1. The students will demonstrate factual knowledge including mathematical terminology, notation, and methods used in this course.** Students will use the vocabulary, symbolism, structure, reasoning, and procedures that are needed to teach the mathematical content for grades 4 – 8+. Course content includes topics from Algebra, Trigonometry, Analytic Geometry, Plane Geometry, Calculus, Number Theory, Probability, and Statistics.
- 2. The students will describe the fundamental principles, generalizations, and theories covered in this course.** Students will show mastery of middle school concepts such as proportionality (multiplicative reasoning), equivalence of numbers, computational fluency, algebraic thinking, and geometry.
- 3. The students will apply course material.** Students will be able to make connections between concepts and also apply knowledge in new and different settings, particularly in the teaching of middle school mathematics.
- 4. The students will develop various skills, competencies, and points of view needed by educators.** These will include:
  - becoming familiar with the National Council of Teachers of Mathematics Principles and Standards for School Mathematics and the Texas Essential Knowledge and Skills (TEKS)
  - using multiple representations to model mathematical concepts
  - working with peers in group activities to promote both listening skills and oral communication skills
  - analyzing ideas, different points of view, and various approaches to problem solving.
- 5. The students will integrate technology and technological methods into teaching and learning.** These will include
  - learning appropriate calculator activities
  - learning how to use Geometer's Sketchpad
- 6. The students will gain a broader understanding and appreciation for mathematics.**

## Course Content

**Textbooks:** *The Nature of Mathematics*, Eleventh Edition, by Karl J. Smith  
*Preparation Manual for the Texas Examination of Educator Standards*  
(TEExES) Mathematics 4-8 (# 115)

Parts of the following chapters from *The Nature of Mathematics* will be covered:

- 1. The Nature of Problem Solving.** Problem solving, inductive and deductive reasoning, scientific notation and estimation
- 2. The Nature of Sets.** Sets, subset, and Venn diagrams, operations with sets, applications of sets
- 5. The Nature of Numbers.** Natural numbers, prime numbers, integers, rational numbers irrational numbers
- 6. The Nature of Algebra.** Polynomials, factoring, equations, inequalities, algebra in problem solving, ratios, proportions, and problem solving, percents
- 7. The Nature of Geometry.** Geometry, polygons and angles, triangles, similar triangles, right-triangle trigonometry, mathematics, art, and non-Euclidean geometries
- 9. The Nature of Measurement.** Perimeter, area, surface area, volume, and capacity, U.S. – Metric Conversions
- 10. The Nature of Growth.** Exponential equations, logarithmic equations, applications of growth and decay
- 11. The Nature of Financial Management.** Sequences and series
- 12. The Nature of Counting.** Permutations, combinations, counting without counting
- 13. The Nature of Probability.** Introduction to probability, mathematical expectation, probability models, calculated probabilities
- 14. The Nature of Statistics.** Frequency distributions and graphs, descriptive statistics, the normal curve
- 15. The Nature of Graphs and Functions.** Cartesian coordinates and graphing lines, graphing half-planes, graphing curves, conic sections, functions.
- 16. The Nature of Mathematical Systems.** Systems of linear equations, problem solving with systems
- 18. The Nature of Calculus.** What is calculus?, limits, derivatives, integrals

All six domains in the *Preparation Manual for the Texas Examination of Educator Standards* will be used throughout the course and also in the following semester when reviewing for the TEExES test. The domains are: Number Concepts, Patterns and Algebra, Geometry and Measurement, Probability and Statistics, mathematical Processes and Perspectives, and Mathematical Learning, Instruction, and Assessment

Students will also become competent with graphing calculators and Geometer's Sketchpad.