

EDU 257
MATH METHODS AND MATERIALS

COURSE DESCRIPTION:

Prerequisites: None

Corequisites: None

This course covers concepts, activities, methods, and materials for teaching mathematics in elementary through middle school grades. Topics include individual instruction, developmental skill building, manipulatives, problem solving, critical thinking, and numerical concepts. Upon completion, students should be able to assess, plan, implement, and evaluate developmentally appropriate math experiences. Course Hours Per Week: Class, 2. Laboratory, 2. Semester Hours Credit, 3.

COURSE OBJECTIVES:

At the completion of this course, the student will be able to:

- a. Describe various methods to effectively teach math concepts to young children.
- b. Explain the various learning styles and learning theories that involve young children.
- c. Describe how to effectively include technology within a math curriculum.
- d. Describe the problem solving process.
- e. Describe the various assessments in mathematics.
- f. Identify the various number meanings.
- g. Explain how to effectively teach multiplication, division, addition, and subtraction.
- h. Explain what students should know about fractions.
- i. Explain methods to teach addition, subtraction, multiplication, and division of fractions.
- j. Explain how to collect, organize and interpret data in various ways.
- k. Explain various teaching strategies and learning activities in measurement.
- l. Describe how to effectively teach geometry and how to develop geometric thinking and spatial sense.
- m. Explain how to effectively develop algebraic thinking.
- n. Understand how to include math games, manipulatives and cooperative learning within curriculum.

OUTLINE OF INSTRUCTION:

- I. Teaching mathematics: influences and directions
 - A. Psychological and professional influences
 - B. Technological and societal influences
 - C. Research and assessments
 - D. Learner and teacher influences
- II. Teaching and learning mathematics
 - A. Learning styles and theoretical premises
- III. Developing mathematical cognition and problem-solving ability
 - A. The problem solving process
 - B. Problem-solving strategies
 - C. Planning for instruction

- IV. Assessing mathematics understanding
 - A. NC Assessment standards
 - B. Assessment instruments

- V. Developing number concepts
 - A. Number foundations
 - B. Number meanings
 - C. Counting and number relationships
 - D. Representing numbers

- VI. Developing an understanding of numeration
 - A. Numeration
 - B. Hindu-Arabic numeration system
 - C. Place value and three digit numbers
 - D. Number relationships
 - E. Large numbers and expanded notation
 - F. Rounding numbers and estimation

- VII. Developing whole number operations: meaning of operations
 - A. Operations with word problems
 - B. Addition and subtraction
 - C. Multiplication and division

- VIII. Developing whole number operations: mastering the basic facts
 - A. Three-Step approach in fact mastery
 - B. Addition and subtraction facts
 - C. Multiplication and division facts

- IX. Estimation and computational procedures for whole numbers
 - A. Computational estimation and mental arithmetic

- X. Developing fraction concepts
 - A. Developing fraction concepts and number sense
 - B. Comparing and ordering fractions
 - C. Equivalent fractions

- XI. Developing fraction computation
 - A. Addition and subtraction of fractions
 - B. Multiplication and division of fractions
 - C. Assessing fraction knowledge

- XII. Developing decimal concepts and computation
 - A. Developing decimal number sense
 - B. Equivalent decimals
 - C. Ordering and comparing decimals
 - D. Writing fractions as decimals
 - E. Writing decimals as fractions
 - F. Scientific notation

- XIII. Understanding ratio, proportion, and percent
 - A. Ratio and Rate
 - B. Proportion
 - C. Percent

- XIV. Developing geometric thinking and spatial sense
 - A. Development of geometric cognition
 - B. Topology and Euclidean geometry
 - C. Three dimensional shapes and figures
 - D. Symmetry, congruence, and similarity
 - E. Tessellations and spatial sense

- XV. Developing measurement concepts and skills
 - A. Concepts and instructional sequence, strategies, and activities

- XVI. Collecting, organizing, and interpreting data
 - A. Graphing and interpreting data/statistics
 - B. Probability

- XVII. Developing integers and algebraic thinking
 - A. Integers, variables, functions

REQUIRED TEXTBOOK AND MATERIALS:

Cathcart, W. *Learning Mathematics in Elementary and Middle Schools*. Merrill Prentice Hall.

STATEMENT FOR STUDENTS WITH DISABILITIES:

Students who require academic accommodations due to any physical, psychological, or learning disability are encouraged to request assistance from a disability services counselor within the first two weeks of class. Likewise, students who potentially require emergency medical attention due to any chronic health condition are encouraged to disclose this information to a disability services counselor within the first two weeks of class. Counselors can be contacted by calling 686-3652 or by visiting the Student Development Office in the Phail Wynn Jr. Student Services Center, room 1309.