ROWAN UNIVERSITY
Department of Mathematics

Syllabus
Math 03.600 - Topics in Elementary Mathematics

CATALOG DESCRIPTION:

Math 03.600 Topics in Elementary Mathematics 3 s.h.

This course is designed to improve the understanding and attitudes of practicing elementary teachers (K-8). Specific topics to be addressed include quantitative reasoning, spatial reasoning, inductive and deductive reasoning, mathematical systems, and communication in mathematics. Students will be expected to do some independent work.

OBJECTIVES:

This course is intended to provide students with the opportunity to develop their knowledge of the content and discourse of mathematics, including:

-- knowledge and understanding of mathematical reasoning: quantitative, spatial, inductive, and deductive.

-- analysis of mathematical systems, such as the real numbers, finite geometries, non-Euclidean geometries, or groups, rings, and fields.

-- use of various types and styles of mathematical communication, including explanations, proofs, examples and nonexamples, and problem solutions.

-- application of mathematical concepts to problems in selected situations.

-- understanding and appreciation of the interrelationships of various areas of mathematics, such as algebra, geometry, and analysis.

CONTENT:

Topics to be considered in this course will be selected from the following outline, in accordance with students' and faculty interests:

I. Pattern

A. Construction of numerical sequences
B. Construction of geometric sequences and patterns
C. Inductive and deductive reasoning
D. Examples and nonexamples

II. Dimension

A. Measuring volumes
B. Fractals
C. Higher dimensions

III. Quantity

A. Numbers and operations
B. Variables and relations
C. Procedures
D. Number systems
E. Applications
F. Topics from number theory

IV. Uncertainty

A. Estimation, graphing, and counting techniques
B. Data analysis
C. Statistical design
D. Probability
E. Inference

V. Shape

A. Classification
B. Symmetry
C. Lattices
D. Representation and visualization
E. Finite geometries
F. Non-Euclidean geometries

VI. Change

A. Dynamical systems
B. Underlying concepts of calculus

VII. Communication in Mathematics

A. Proof
B. Types and styles of oral and written communication
C. Explanation of concepts and algorithms
D. Examples and nonexamples
E. Problem solutions

POSSIBLE TEXT(S):

This course is particularly suitable for the use of multiple texts. Two which have been successfully used together are the following:

On the Shoulders of Giants: New Approaches to Numeracy by Lynn Arthur Steen.
Washington, D.C.: National Academy Press, 1990.

Principles & Standards for School Mathematics
from the National Council of Teachers of Mathematics. Reston, VA: NCTM, 1989.

Rubenstein, Beckmann, Thompson, TEACHING & LEARNING MIDDLE GRADE MATHEMATICS, Key College Pub, 2004

Great Source, MATH ON CALL: A MATHEMATICS HANDBOOK, Houghton Mifflin Co., 1998

Charles Randall, MATHEMATICS:GRADES K-ALGEBRA MATH ACROSS THE GARDENS, Pearson-Prentice Hall, 2005.

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