Miami-Dade Community College

Common Course Number: MAE 3330

Course Title: Problem solving in Secondary Mathematics

Catalogue Course Description:

This course involves the study of problem-solving strategies appropriate for secondary mathematics courses. Particular subject areas include number concepts, measurement, geometry, algebra, probability, statistics, trigonometry, analytic geometry, and calculus. The course addresses specific Sunshine State Standards, subject matter competencies, and pedagogy pertinent to the discipline and required for certification.

Credit Hours Breakdown: *One credit*.

Prerequisite: MAC 2312 or department approval.

Course Competencies:

Competency 1: The student will demonstrate comprehension of the four basic principles of problem solving.

Upon successful completion of this course, the student will demonstrate comprehension of the four basic principles of problem solving by:

A. Describing given problems.

B. Formulating plans to solve problems.

C. Executing problem solving plans.

D. Verifying problem results.

Competency 2: The student will apply the problem solving principles to solve problems related to number sense, concepts and operations.

Upon successful completion of this course, the student will apply the problem solving principles to solve problems related to number sense, concepts and operations by:

A. Describing the different ways numbers are represented and used in the real world.

B. Explaining the relationships and effects of operations on number systems.

C. Using estimation in problem solving and computation.

D. Utilizing elementary number theory concepts.

Competency 3: The student will apply the problem solving principles to solve problems related to measurement.

Upon successful completion of this course, the student will apply the problem solving principles to solves problems related to measurement by:

A. Measuring quantities found in the real world.

B. Comparing, contrasting and converting within or between systems of measurement.

C. Using measurement estimations in real-world applications.

Competency 4: The student will apply the problem solving principles to solve problems related to geometry.

Upon successful completion of this course, the student will apply the problem solving principles by:

A. Describing fundamental geometric concepts and relationships.

B. Explaining different types of polygons and their properties and classifications.

C. Explaining fundamental concepts of logic

D. Discussing alternate approaches to Euclidian geometry.

E. Investigating, defining, and applying the concepts of congruence and similarity.

F. Utilizing relationships among lines, angles, and circles.

G. Using the axiomatic approach to write direct or indirect proofs of geometric theorems.

Competency 5: The student will apply the problem solving principles to solve problems related to algebraic thinking.

Upon successful completion of this course, the student will apply the problem solving principles to solves problems related to algebraic thinking by:

A. Describing, analyzing, and generalizing a variety of patterns, relations, and functions.

B. Using expressions, equations, inequalities, graphs, and formulas to represent and interpret real-world situations.

C. Using coordinate geometry to locate geometric objects in both two and three dimensions and representing these objects algebraically.

D. Factoring and multiplying polynomials.

E. Utilizing polynomial factoring to solve real-world problems.

F. Solving problems involving rational exponents.

G. Describing the relationships between algebraic functions or relations and their graphs.

H. Utilizing matrix algebra in appropriate problem solving situations.

Competency 6: The student will apply the problem solving principles to solve problems related to probability, statistics and data analysis.

Upon successful completion of this course, the student will apply the problem solving principles to solve problems related to probability, statistics and data analysis by:

A. Using basic concepts of theoretical and experimental probability.

B. Utilizing statistical techniques for data analysis.

C. Interpreting discrete and continuous probability distributions.

Competency 7: The student will apply the problem solving principles to solve problems related to analytic geometry and calculus.

Upon successful completion of this course, the student will apply the problem solving principles to solve problems related to analytic geometry and calculus by:

A. Explaining uses of the circular/trigonometric functions and their inverses.

B. Utilizing plane or solid analytic geometry in real-world situations.

C. Deriving equations of conic sections.

D. Computing values of exponential and logarithmic functions.

E. Calculating limits of functions and sequences.

F. Finding derivatives of functions.

G. Utilizing definite integrals in problem solving situations.

H. Using the concepts of infinite series in problem solving situations.