Course Syllabus

Department: Mathematics

Date: January 25, 2012

I. Course Prefix and Number: MAT 180

   Course Name: Mathematics For Elementary School Teachers I

   Credit Hours and Contact Hours: 3 Credit Hours, 3 Contact Hours

   Catalog Description including pre- and co-requisites:

   This course is the first of a two-semester sequence designed for prospective elementary education teachers. The course presentation and material will conform to the NCTM Standards and therefore will present mathematics in the context of problem solving, communication (both oral and written), reasoning, including direct and indirect proofs, and mathematical connections. Students will explore mathematical concepts and theories underlying the topics including: set theory, numeration and different number systems, operations on integers, rational and irrational numbers, prime and composite numbers, divisibility and modular arithmetic.

   Prerequisite: None

II. Course Outcomes and Objectives

   Student Learning Outcomes:

   Upon completion of the course the participant will be able to:

   1. Demonstrate competence in the basic mathematical structures and topics in the N-9 curriculum.
   2. Communicate mathematical ideas both verbally and in writing.
   3. Explain the reasoning behind mathematical ideas and their connection to algorithms.
   5. Demonstrate critical thinking.
   6. Demonstrate the use of both direct and indirect reasoning.
   7. Model a positive attitude towards mathematics

   Relationship to Academic Programs and Curriculum:

   This course is an introductory college level course that fulfills elective mathematics/science course requirements for all A.A., A.S. and A.A.S. degree programs. A student should verify the appropriateness of this course for his program with his advisor.

   College Learning Outcomes Addressed by the Course:

   ◼ writing  ◼ computer literacy
   ◼ oral communications  ◼ ethics/values
   ◼ reading  ◼ citizenship
   ◼ mathematics  ◼ global concerns
   ◼ critical thinking  ◼ information resources
III. Instructional Materials and Methods

Types of Course Materials:
1. Textbook: Selected by department.
2. Scientific calculator

Methods of Instruction (e.g. Lecture, Lab, Seminar …):
1. Lectures
2. Discussions
3. Demonstrations
4. Group activities
5. Experiments
6. Use of computers
7. Collaborative activities.

IV. Assessment Measures (Summarize how the college and student learning outcomes will be assessed):

Student Learning Outcomes will be assessed through a variety of activities. The Mathematics department believes that each instructor should determine the grading system and evaluation methods that will be used in their sections of the course. Any grading system used in the course must be consistent with the College Catalog. These methods must be communicated to students the first week of the semester in writing. Possible evaluation methods include quizzes, tests, portfolios, collected assignments, group activities, et. al. Such evaluations and related assignments will develop a student's ability to read problems carefully, perform mathematics and use critical thinking techniques. Course policies with respect to attendance, late work, plagiarism, etc. must be communicated to the student.

V. General Outline of Topics Covered:

Problem Solving
Polya’s Principles
Look for patterns
Strategies
a) Making a table
b) Consider special cases
c) Generalize
d) Using manipulative materials
e) Trial and error
f) Drawing a diagram
g) “Acting” out the problem

B. Sets
1. Representations
   a) Description (well-defined)
   b) Roster notation
   c) Set-builder notation
   d) Venn diagram

2. Relationships and special sets
   a) Subsets
   b) One- to-one correspondences
c) Equivalent sets
d) Universal set
e) Empty set

3. Operations
   a) Complement
   b) Intersection
   c) Union

C. Number Systems
   1. Numeration Systems Past and Present
   2. Other number bases.
      a) Binary numbers
      b) Hexadecimal numbers
      c) Conversion from one base to another
      d) Operations

D. Whole numbers
   1. Properties
   2. Algorithms for binary operations
   3. Mental arithmetic
   4. Estimation

E. Number Theory
   1. Prime and composite numbers
   2. Tests for divisibility
   3. Greatest common divisors
   4. Least common multiples
   5. Modular Arithmetic

F. Integers
   1. Representations of integers
   2. Properties
   3. Arithmetic operations
   4. Equations and inequalities

G. Rational Numbers
   1. Properties and basic concepts of fractions and rational numbers
   2. Operations and computations with fractions and decimals
   3. Conversions between representations
   4. Estimation
   5. Ratio and proportion
   6. Percents

H. Real Numbers
   1. Introduction to irrational numbers
      a) Pi
      b) Square root of two
   2. Properties
   3. Pythagorean Theorem