

Departmental Syllabus **Math 1030 – Mathematics for Educators I**

Textbooks:

Mathematics for Elementary School Teachers, 2nd Edition by P. O'Daffer, R. Charles, T. Cooney, J. Dossey, J. Schielack. Addison-Wesley, 2002.

Teaching and Learning Elementary and Middle School Mathematics, 5th Edition by L.J. Sheffield and D.E. Cruikshank. Wiley, 2005.

Prerequisites: MATH 15 with a grade of "C" or better or mathematics proficiency level of 15 or above.

Course Description: Math 1030 is the first semester in a three-semester sequence of integrated content and methods courses for preservice teachers. It is open only to students in elementary education pursuing certification levels B – 11 or 10 – 14. (The course is not intended for students pursuing certification level 10 – 21.) Topics covered include problem solving; history and development of number systems; sets; functions and algebraic reasoning; and fundamental operations with whole numbers and integers. Throughout the course, students will be expected to explain their reasoning using appropriate vocabulary and notation.

Test-out Policy: Math 1030 is an integrated content and methods course for preservice teachers. Much of the content material will be embedded in in-class activities that model a variety of teaching methods. As a result, students will be actively involved in doing mathematics during the class period. Because of the significant amount of in-class participation, a student will not be allowed to test out of this course.

Topics to be covered:

Problem Solving – Problem solving is a large component of this course as well as Math 2030 and Math 3030. As such, we begin this course with a unit on problem solving. Students will be expected to explain their reasoning using appropriate vocabulary and notation.

- The Problem-Solving Process and Problem-Solving Strategies
- Patterning
 - Arithmetic Sequences
 - Geometric Sequences
 - Fibonacci and Fibonacci-like Sequences
 - Figurate Numbers
 - Finite Differences
 - Pascal's Triangle
 - Organized Counting
- Inductive Reasoning, Deductive Reasoning, and Indirect Reasoning
- Basic Descriptive Statistics
- Functions and Algebraic Reasoning
 - Function Representation
 - Generalizing

Sets and Numeration Systems – In this unit we develop some of the foundational work for whole number operations. Students will be expected to justify their work using appropriate vocabulary and notation.

- Equal Sets, Equivalent Sets, and Subsets
- One-to-One Correspondence
- Inequalities
- Set Operations (Union, Intersection, Difference, Cartesian Product, Set Complements)
- Venn Diagrams
- Numeration Systems
 - Concept of Number
 - Hindu-Arabic System
 - Ancient Systems of Numeration
 - Other Number Bases

Whole Numbers – In this unit we develop the whole number operations. We begin by modeling whole-number operations. This is followed by development of the properties and algorithms for whole-number operations. Students will be expected to justify their work using appropriate vocabulary and notation.

- Modeling Whole-Number Operations
- Properties of Whole Numbers
- Strategies for Teaching Basic Facts of Whole Number Operations
- Order of Operations
- Algorithms for Whole Number Operations
- Mental Computation
- Estimation

Integers – In this unit we explore integers. Again we will model integer operations before developing the properties and algorithms of integers. Students will be expected to justify their work using appropriate vocabulary and notation.

- Modeling Integer Operations
- Properties of Integers