



MATH 2010

Division: Natural Science and Mathematics

Department: Mathematics

Course: MATH 2010

Title: Mathematics for Elementary Teachers I

Catalog Description:

Mathematics for Elementary Teachers I is the first of a two-course series designed to improve the mathematical understanding of prospective elementary teachers. Concepts covered include problem-solving, sets, functions, numeration systems, number theory, rational numbers (fractions), decimals, percents, and integers. The course will combine a thorough treatment of mathematical concepts with pedagogical philosophy to help prospective teachers learn to teach mathematics with understanding and insight.

General Education Requirements: N/A

Semesters Offered: Fall

Credit/Time Requirement: Credit: 3; Lecture: 3; Lab: 0

Clock/Hour Requirements: 0

Offered for Non-Credit: No

Prerequisites: MATH 1050

Justification:

All elementary education programs require mathematical competency of students prior to student teaching. This course and Math 2020 are aimed at helping students arrive at that competency. This course is required at all the four-year public institutions except University of Utah and Utah State. The University of Utah has expanded the course to four credits and given it a 4000 course number. Utah State University requires Math 1040 and Math 2020.

Student Learning Outcomes:

The student will understand techniques of problem solving using a variety of methods and will solve many types of problems.

The student will understand principles, properties, and algorithms for whole numbers and how to use them.

The student will understand properties of elementary number theory and how to use them.

The student will understand principles, properties, and algorithms for fractions / rational numbers and how to use them.

The student will understand principles, properties, and algorithms for decimals and percents and how to use them.

The student will understand principles, properties, and algorithms integers and how to use them.

Content:

- Problem solving using a variety of methods
- Understanding sets as a basis for numeration
- Whole numbers
- Properties and operations
 - Computation, both written and mental
- Number Theory
- Fractions / Rational Numbers
 - Understanding the concept of a fraction
 - Properties and arithmetic operations
- Decimals and percents
- Integers and their properties

Students will complete individual assignments, participate in group problem-solving and activities, and take regular examinations. The use of technology including manipulatives, physical and/or virtual, is emphasized.

General Education Outcomes:

- 1) Read effectively, constructively, and critically.

One of the crucial skills in mathematics is the ability to read carefully and clearly so one understands the problem and can then use appropriate methods to solve it. Emphasis is given on being able to read for meaning.

For example, one problem may state, "There are 20 people at a party. If each guest shakes hands once with all the other guests, how many handshakes will there be?" To correctly solve the problem, it is important that the student understand how many people are at the party and that if Alice shakes hands with Bob then Bob has shaken hands with Alice.

- 6) Apply computational skills to a variety of contexts.

The ability to understand and use mathematical principles is a major component of the course. Algebra skills are a prerequisite to the course and enable the student to understand the standard algorithms for arithmetic and learn additional algorithms.

For the handshaking problem mentioned above, the student may use a variety of strategies to solve the problem. The student may draw a diagram of the guests and lines representing handshakes then look for patterns. Alternatively, a student may make a list of the handshakes (again looking for patterns). Also, the student may solve a simpler problem such as a party with 3, 4, or 5 guests and then generalize the result. Students with a solid background in algebra may use combinations to solve the problem. The answer would be found by finding the number of combinations of 20 things taken two at a time, ${}_{20}C_2$.

Key Performance Indicators:

Student learning will be evaluated through daily assignments and periodic examinations. Understanding will also be evaluated by observation of students as they demonstrate their reasoning to the class and as they participate in group activities.

The point breakdown for computing the final grade will be:

Exams (midterms and final):	50-70%
Homework:	15-25%
Classroom Participation:	0-10%
Other activities:	0-15%

Representative Text and/or Supplies:

Musser, Burger, and Peterson, *Mathematics for Elementary Teachers: A Contemporary Approach*, current edition, John Wiley & Sons, Inc.

Billstein, Libeskind, and Lott, *A Problem Solving Approach to Mathematics for Elementary School Teachers*, current edition, Addison Wesley.

Optimum Class Size: 24

Maximum Class Size: 32

Signatures:

I hereby submit this course syllabus:

Kari Arnoldsen, PhD, Professor

I hereby find this course consistent with the goals and resources of the Mathematics Department:

Kari Arnoldsen, PhD, Professor, Chair

I hereby find this course consistent with the goals and resources of the Natural Science and Mathematics Division:

Dan Black, EdD, Associate Professor, Dean

I have discussed the need for library resources related to this class with the person submitting the syllabus:

Lynn Anderson, MLIS, Technical Services Librarian (Main Campus)

Michelle Olsen, MLS, Campus Librarian (Richfield Campus)