MTH 211: Foundations of Elementary Mathematics

**Catalog Description:** Introduction to problem solving, sets, whole numbers, number theory, fractions, decimals, percent, ratio and proportion, integers. Intended primarily for prospective elementary teachers.

**Course Credits:** 4

**Terms Offered:** F, W

**Enforced Prerequisites:** MTH 095 or MTH 103 with C- or better, or ALEKS math placement test: 46%, or math placement test: 17, or instructor permission.

**Meetings:** Two 110-minute class sessions combine short lectures and in-depth in-class activities in a professional workshop format

**Course Content:** Intended primarily for prospective elementary teachers.

1. Introduction to problem solving
2. Sets
3. Whole numbers
4. Number theory
5. Fractions, decimals, percent, ratio and proportion
6. Integers.

**MTH 211 Measurable Student Learning Outcomes:** A successful student in MTH 211 will be able to:

- Utilize several different problem-solving strategies along with Polya's four-step problem solving process to solve a variety of problems.
- Define and illustrate with Venn diagrams as well as verbal descriptions and listing, basic concepts of sets such as: element of a set, empty set, disjoint sets, equal sets, equivalent sets, subset, proper subset, union, intersection, set complement, set difference, ordered pair, Cartesian product, finite set, infinite set.
- Correctly use and understand standard mathematical vocabulary connected with K-8 level mathematics concepts.
- Apply a number of models commonly used for teaching and understanding of mathematical concepts in K-8, such as a whole-number line, multibase pieces, and chips and tiles.
- Distinguish between numeration systems that are additive, subtractive, positional, multiplicative, and or place value systems and understand the significance of place value in our base ten system as well as other systems.
- State, and identify in practice, properties of whole number operations such as closure, commutativity, associativity, distributivity, identity and determine which of these properties hold for which operations.
- Recognize, model, and design problems illustrating the variety of conceptual approaches to addition, subtraction, multiplication and division.
- Describe the thought processes used to compute mentally and/or estimate as well as understand exactly how the properties of whole number operations enable the use of various thinking strategies including use of compatible numbers, compensation, left-to-right methods, range estimation, and rounding.
- Demonstrate how and why the steps in (standard and nonstandard) algorithms for addition, subtraction, multiplication, and division work.
- Determine whether a given number is prime or composite. State the Fundamental Theorem of Arithmetic and understand its relevance in a variety of contexts.
- Demonstrate why the tests for divisibility for 2, 3, 4, 5, 8, 9, 10, and combinations of these tests work.
- Use rectangular array models to represent and prove results about even and odd numbers, prime numbers, composite numbers, perfect square numbers, etc.
• Find the greatest common factor (GCF) and least common multiple (LCM) of two or more numbers using
manipulatives, Venn diagrams, prime factorization method, listing method, and/or other methods and explain
how these methods work.
• State and apply the definition of fraction and distinguish between the "Part-to-Whole" concept and the
"Relative Amount" concept of fraction. Use these ideas together with a variety of models to solve problems
involving fractions.
• Identify unit fractions and understand the relationship between unit fractions and the number line model.

MTH 211 satisfies the Baccalaureate Core Skills category for Mathematics and successful completion of the
Mathematics category is one of OSU’s First Year Skills requirements.

Baccalaureate Core Learning Outcomes:

1. Identify situations that can be modeled mathematically.
2. Calculate and/or estimate the relevant variables and relations in a mathematical setting.
3. Critique the applicability of a mathematical approach or the validity of a mathematical conclusion.

Evaluation of Student Performance: Your grade and measurement of your progress on the course outcomes will
be based on daily in-class activities, written homework and quizzes, and reflective writing, along with two written
midterms and final exam. (Approximate percentages given.)

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<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>In-class activities</td>
<td>15%</td>
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<tr>
<td>Written Homework</td>
<td>5%</td>
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<tr>
<td>Quizzes</td>
<td>15%</td>
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<tr>
<td>Reflective Writing</td>
<td>5%</td>
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<tr>
<td>Two Midterms</td>
<td>35%</td>
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<tr>
<td>Final Exam</td>
<td>25%</td>
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Learning Resources: Required Textbook: Mathematics For Elementary Teachers, by Gary L. Musser, Blake E.
Peterson, and William F. Burger (2013, Tenth Edition) or other similar text selected by department. Calculator.

Selected portions of the text will be covered as follows.

Chapter 1: 1.1, 1.2
Chapter 2: 2.1, 2.2, 2.3
Chapter 3: 3.1, 3.2, 3.3
Chapter 4: 4.1, 4.2, 4.3
Chapter 5: 5.1, 5.2
Chapter 6: 6.1

Students With Disabilities: Accommodations are collaborative efforts between students, faculty and Disability
Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the
faculty member in charge of the course prior to or during the first week of the term to discuss accommodations.
Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS
should contact DAS immediately at 737-4098.

Academic Honesty and Student Conduct: Students are expected to be familiar with the Homework and Exam
policies stated in this syllabus, as well as Oregon State University's Student Conduct Code.