MTH 211 : FUNDAMENTALS OF ELEMENTARY MATHEMATICS I

Transcript title

Fund of Elementary Math I

Credits

4

Grading mode

Standard letter grades

Total contact hours

40

Lecture hours

40

Prerequisites

MTH 095 or higher (except MTH 098, MTH 102, MTH 105Z, MTH 244, and STAT 243Z) or minimum placement Math Level 18.

Course Description

Introduces problem solving, sets, natural and whole numbers, number theory and fractions. First term of a sequence for students planning to become elementary teachers but open to any students wanting to study the foundations of mathematics.

Course learning outcomes

1. Use a variety of problem-solving techniques to analyze and solve problems from a variety of disciplines.
2. Use multiple models to describe concepts and computations of whole numbers.
3. Define the term algorithm and give multiple examples of non-standard algorithms.
4. Use number theory concepts to solve problems and analyze computational algorithms.
5. Use multiple models to describe concepts and computations involving fractions.
6. Use the language and practices described in the Standards of Mathematical Practices (Common Core State Standards).

Content outline

1. Problem Solving
   a. Students will use a variety of problem-solving techniques to analyze and solve problems from a variety of disciplines.
      i. Techniques will include exploring patterns, developing mathematical models, working backwards, creating tables of data, drawing graphs, using equations, estimating the reasonableness of an answer using a calculator or other appropriate technology.
2. Mathematical Language and Structure
   a. Students will use multiple models to describe concepts and computations of whole numbers.
      i. Use set theory symbolism, including Venn diagrams, to interpret mathematical ideas.
      ii. Use number systems other than base-ten to describe base-ten concepts for whole numbers.
      iii. Explore numeration systems of other cultures to highlight the arbitrariness of our current base-ten system.
      iv. Define the set of whole numbers and their properties.
      v. Understand place value and base ten.
      vi. Understand how the language of our number system (specifically counting) and sense making often create difficulties for students.
      vii. Estimate and use mental arithmetic.
   b. Students will use multiple models to describe concepts and computations involving fractions.
      i. Define fractions and their properties.
      ii. Use area, linear, and set models for fractions.
      iii. Connect number theory concepts of GCF, LCM, and prime factorization to fraction computation.
3. Computation
   a. Students will define the term algorithm and give multiple examples of non-standard algorithms.
      i. Compare and contrast non-standard algorithms to those algorithms traditionally taught.
   b. Students will use multiple models to describe concepts and computations of whole numbers.
      i. Use number systems other than base-ten to describe base-ten computations for whole numbers.
      ii. Analyze standard algorithms and how they make sense (or not) based on place value norms.
   c. Students will use multiple models to describe concepts and computations involving fractions.
      i. Define fractions and their properties.
      ii. Use area, linear, and set models for fractions.
      iii. Connect number theory concepts of GCF, LCM, and prime factorization to fraction computation.
4. Number Theory
   a. Students will use number theory concepts to solve problems and analyze computational algorithms.
      i. Identify and distinguish between prime and composite numbers.
      ii. Describe and use the divisibility rules for 2, 3, 4, 5, 6, 8, 9, and 10.
      iii. Find the least common multiple (LCM) and the greatest common factor (GCF) of two or more numbers in multiple ways.
      iv. Use factoring, divides, divisibility rules, greatest common factor, and least common multiple as tools for developing number sense.
5. Standard of Mathematical Practice
   a. Students will use the language and practices described in the Standards of Mathematical Practices (Common Core State Standards).
      i. Make sense of problems and persevere in solving them.
      ii. Reason abstractly and quantitatively.
      iii. Construct viable arguments and critique the reasoning of others.
      iv. Model with mathematics.

v.   Use appropriate tools strategically.

vi.   Attend to precision.

vii.   Look for and make use of structure.

viii.   Look for and express regularity in repeated reasoning.

Required materials

This course may require a textbook.

General education/Related instruction lists

- Science not Lab
- Mathematics