COLLIN COLLEGE EXPANDED GENERIC COURSE SYLLABUS

COURSE INFORMATION

Course Number: MATH 1350
Course Title: Mathematics for Teachers I
Credit Hours: 3
Lecture Hours: 3
Lab Hours: 0

Prerequisite
MATH 1314; or equivalent.

Course Description
This course is intended to build or reinforce a foundation in fundamental mathematics concepts and skills. It includes the conceptual development of the following: sets, functions, numeration systems, number theory, and properties of the various number systems with an emphasis on problem solving and critical thinking. Note: This course is intended for students pursuing the AAT degree with an emphasis on middle grades (4 - 8) and early childhood through grade 6.

Textbook/Supplies
A Problem Solving Approach to Mathematics for Elementary and Middle School Teachers, 14th edition. 2025, Pearson, by Billstein, Boschmans, Libeskind, Lott, Beaudrie.

Supplies: Scientific or graphing calculator (optional). The use of a calculator is up to the discretion of the instructor.

STUDENT LEARNING OUTCOMES (SLO)

Upon completion of this course the students should be able to do the following:

1. Explain and model the arithmetic operations for whole numbers and integers. (Critical Thinking and Communication)
2. Explain and model computations with fractions, decimals, ratios, and percentages. (Critical Thinking and Communication)
3. Describe and demonstrate how factors, multiples, and prime numbers are used to solve problems. (Empirical and Quantitative)
4. Apply problem solving skills to numerical applications. (Critical Thinking and Empirical and Quantitative)
5. Represent and describe relationships among sets using the appropriate mathematical terminology and notation. (Communication)
6. Compare and contrast structures of numeration systems. (Critical Thinking)

REQUIRED CORE OBJECTIVES FOR MATHEMATICS

As per the Texas Higher Education Coordinating Board, mathematics students must develop and demonstrate the following three required core objectives:

- Critical Thinking Skills - creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information.
- Communication Skills - effective development, interpretation and expression of ideas through written, oral and visual communication.
- Empirical and Quantitative Skills - manipulation and analysis of numerical data or observable facts resulting in informed conclusions.

METHOD OF EVALUATION

Course requirements

Attending class**,** completing homework assignments, core assessments, and completing required exams.

Course format

Lecture and guided practice.

A minimum of three proctored exams, three core assessments, and a proctored comprehensive final exam are required. The final exam must be comprehensive (i.e., include questions from all chapters covered) and must count at least as much as any regular exam. Online homework is required and must count for a minimum of 5% of the total course grade. Core assessments will be provided by the course coordinator. Graded core assessments will count for 5%–10% of the overall course grade. The specific weight of each evaluation component will be detailed in the individual instructor's syllabus. Credit for all out-of-class coursework—including homework assignments, service-learning projects, and other assessments and learning activities—may not exceed 25% of the total course grade. At least 75% of a student's grade must consist of proctored exams. No student may retake any of these exams.

Core Assessment Statement

Core assessments consist of problems or tasks that measure student achievement of state required core objectives – Critical Thinking Skills, Communication Skills, and Empirical and Quantitative Skills. These assessments are designed to be meaningful and require students to extend and apply course concepts. Students should be able to clearly see how these assessments reflect both the skills they are developing and the outcomes of the course.

COURSE POLICIES

College-wide policies are pre-loaded into the Concourse Syllabi and are not duplicated in the Expanded Generic Syllabi for each course.

Instructor specific policies should be added to the Concourse Syllabus.

COURSE CONTENT

Proofs and derivations will be assigned at the discretion of the instructor. The student will be responsible for knowing all definitions and statements of theorems for each section outlined in the following modules.

Module 1: Numeration Systems and Sets

The student will be able to:

1. Define a set and its elements (SLO5)
2. Distinguish between sets that are well-defined and not well-defined (SLO5)
3. Describe a set using list notation and set-builder notation (SLO5)
4. Determine the number of one-to-one correspondences between two sets (SLO5)
5. Define (explain the difference between) equal and equivalent sets (SLO5)
6. Give examples of sets that are equal and equivalent (SLO5)
7. Find the cardinal number of a set (SLO5)
8. Distinguish between a finite set and an infinite set (SLO5)
9. Define (explain the difference between) subset and a proper subset (SLO5)
10. Systematically list all subsets of a set (SLO5)
11. Define and used proper notation for the empty set (SLO5)
12. Perform operations on sets (intersection, union, complement) (SLO5)
13. Perform set operations using Venn diagrams (SLO5)
14. Find the Cartesian product of two sets (SLO5)
15. Describe characteristics of different systems of numeration (SLO6)
16. Convert numbers in and out of other systems of numeration (SLO6)
17. Write a number in expanded form (SLO5)
18. Convert numbers into base-10 and out of base-10. (SLO6)

Module 2: Whole Numbers, Number Theory, and Integers

The student will be able to:

1. Define the sets of natural numbers and whole numbers (SLO5)
2. Illustrate and perform calculations using different models for the four arithmetic operations on whole numbers (SLO1)
3. Explain the properties of the four arithmetic operations on whole numbers (SLO1)
4. Perform different algorithms for the four arithmetic operations on whole numbers (SLO1)
5. Investigate and describe strategies for mental arithmetic (SLO1)
6. Estimate answers to arithmetic problems using multiple strategies (SLO1)
7. Perform arithmetic operations on numbers in bases other than base-10. (SLO6)
8. Define exponentiation as repeated multiplication (SLO3)
9. Define negative exponents and use the properties of exponents (SLO5)
10. Define even and odd numbers (SLO5)
11. Explain the difference between divides, factor, divisor, multiple (SLO3)
12. Explain and use the divisibility rules for 2, 3, 4, 5, 6, 8, 9, and 10 (SLO3)
13. Determine whether a whole number is prime or composite (SLO3)

14. Write the prime factorization of a whole number (SLO3)
15. State the Fundamental Theorem of Arithmetic (SLO3)
16. Determine the number of divisors of a whole number (SLO3)
17. Find the greatest common divisor (GCD) of two or three whole numbers using multiple methods (SLO3)
18. Find the least common multiple (LCM) of two or three whole numbers using multiple methods (SLO3)
19. Define the set of integers (SLO5)
20. Define and calculate absolute value (SLO1)
21. Illustrate and perform calculations using different models for the four arithmetic operations on integers (SLO1)
22. Explain the properties of the four arithmetic operations on integers (SLO1)
23. Solve problems by applying the order of operations (SLO1)

Module 3: Rational Numbers and Proportional Reasoning

The student will be able to:

1. Define the set of rational numbers (SLO5)
2. Model rational numbers (SLO2)
3. Determine if a rational number is proper or improper (SLO5)
4. Determine if two rational numbers are equivalent (SLO2)
5. Create equivalent fractions (SLO2)
6. Simplify a rational number (SLO2)
7. Arrange a set of rational numbers in order from smallest to largest (SLO2)
8. Discuss the denseness of the rational numbers (SLO2)
9. Find a fraction in between two other fractions using more than one method (SLO2)
10. Perform and explain the four arithmetic operations with rational numbers (SLO2)
11. Illustrate and perform calculations using different models for the four arithmetic operations on rational numbers (SLO2)
12. Convert between mixed numbers and improper fractions (SLO2)
13. Estimate answers to arithmetic problems involving rational numbers using multiple strategies (SLO2)
14. Investigate and describe strategies for mental arithmetic with rational numbers (SLO2)
15. Define exponentiation as repeated multiplication (SLO3)
16. Define negative exponents and use the properties of exponents (SLO5)
17. Define ratio and proportion (SLO5)
18. Solve various application problems using proportions (SLO4)

Module 4: Decimals, Percent, and Real Numbers

The student will be able to:

1. Explain the connection between decimals and fractions (SLO5)
2. Write a decimal in words (SLO5)
3. Write a decimal in expanded form with place values (SLO2)
4. Write a decimal as a rational number (and vice versa) (SLO5)

5. Arrange a set of decimals in order from smallest to largest (SLO2)
6. Perform and explain the four arithmetic operations with decimals (SLO2)
7. Express numbers in scientific notation (SLO5)
8. Round a decimal to the nearest given place value (SLO5)
9. Classify decimals as either repeating, terminating, or non-terminating (SLO5)
10. Write a repeating decimal as a rational number (SLO5)
11. Define percent as a ratio (SLO5)
12. Solve application problems using percents (SLO4)
13. Investigate and describe strategies for mental arithmetic with percents (SLO2)
14. Define the set of irrational numbers (SLO5)
15. Define the set of real numbers (SLO5)
16. Define square roots and other roots (SLO5)
17. Simplify roots (SLO3)
18. State the Pythagorean theorem (SLO5)
19. Solve problems using the Pythagorean theorem. (SLO4)
20. Classify a number as natural, whole, integer, rational, irrational, or real. (SLO5)

Module 5: Variables, Equations, and Functions

The student will be able to:

1. Define a variable (SLO 5)
2. Translate statements into mathematical expressions or equations using variables (SLO5)
3. Recognize algebraic patterns (SLO4)
4. Write equations for algebraic patterns (SLO4)
5. Solve equations using properties of equality (SLO4)
6. Determine if a given relation is a function (SLO5)
7. State the domain and range of a function (SLO5)
8. Represent a function in multiple ways (as a rule, machine, equation, arrow diagram, table, set of ordered pairs, and a graph) (SLO5)
9. Graph a linear function (SLO5)
10. Interpret graphs of functions (SLO5)
11. Calculate the composition of functions (SLO5)