MATH-1370: MATHEMATICS FOR ELEMENTARY AND MIDDLE SCHOOL TEACHERS I

Cuyahoga Community College

Viewing: MATH-1370: Mathematics for Elementary and Middle School Teachers I

Board of Trustees:
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Academic Term:
Spring 2019

Subject Code
MATH - Mathematics

Course Number:
1370

Title:
Mathematics for Elementary and Middle School Teachers I

Catalog Description:
First of two semester sequence designed for elementary and middle school education majors. Emphasis on understanding ideas and concepts. Includes sets and numeration, whole numbers, number theory, fractions, decimals, integers, rational and real numbers, problem solving strategies, and historical topics. Highlights applications to classroom, projects, and use of current technology, including scientific/graphing calculators and computers.

Credit Hour(s):
4

Lecture Hour(s):
4

Requisites

Prerequisite and Corequisite
MATH-0965 Intermediate Algebra, or sufficient score on Math placement test, or departmental approval: equivalent coursework.

Note: MATH-1200 or 1280 taken prior to Fall 2016, or MATH-1270 taken prior to Summer 2017 will also be accepted to meet prerequisite requirements for this course.

I. ACADEMIC CREDIT

Academic Credit According to the Ohio Department of Higher Education, one (1) semester hour of college credit will be awarded for each lecture hour. Students will be expected to work on out-of-class assignments on a regular basis which, over the length of the course, would normally average two hours of out-of-class study for each hour of formal class activity. For laboratory hours, one (1) credit shall be awarded for a minimum of three laboratory hours in a standard week for which little or no out-of-class study is required since three hours will be in the lab (i.e. Laboratory 03 hours). Whereas, one (1) credit shall be awarded for a minimum of two laboratory hours in a standard week, if supplemented by out-of-class assignments which would normally average one hour of out-of-class study preparing for or following up the laboratory experience (i.e. Laboratory 02 hours). Credit is also awarded for other hours such as directed practice, practicum, cooperative work experience, and field experience. The number of hours required to receive credit is listed under Other Hours on the syllabus. The number of credit hours for lecture, lab and other hours are listed at the beginning of the syllabus. Make sure you can prioritize your time accordingly. Proper planning, prioritization and dedication will enhance your success in this course.

The standard expectation for an online course is that you will spend 3 hours per week for each credit hour.

II. ACCESSIBILITY STATEMENT

If you need any special course adaptations or accommodations because of a documented disability, please notify your instructor within a reasonable length of time, preferably the first week of the term with formal notice of that need (i.e. an official letter from the Student Accessibility Services (SAS) office). Accommodations will not be made retroactively.
III. ATTENDANCE TRACKING

Regular class attendance is expected. Tri-C is required by law to verify the enrollment of students who participate in federal Title IV student aid programs and/or who receive educational benefits through other funding sources. Eligibility for federal student financial aid is based in part on enrollment status.

Students who do not attend classes for the entire term are required to withdraw from the course(s). Additionally, students who withdraw from a course or stop attending class without officially withdrawing may be required to return all or a portion of their financial aid based on the date of last attendance. Students who do not attend the full session are responsible for withdrawing from the course(s).

Tri-C is responsible for identifying students who have not attended a course before financial aid funds can be applied to students’ accounts. Therefore, attendance is recorded in the following ways:

- For in-person and blended-learning courses, students are required to attend the course by the 15th day of the semester (or equivalent for terms shorter than five weeks) to be considered attending. Students who have not met all attendance requirements for in-person and blended courses, as described herein, within the first two weeks or equivalent, will be considered not attending.
- For online courses, students are required to login at least two times per week and submit one assignment per week for the first two weeks of the semester, or equivalent to the 15th day of the term. Students who have not met all attendance requirements for online courses, as described herein, within the first two weeks or equivalent, will be considered not attending.

At the conclusion of the first two weeks of a semester or equivalent, instructors report any registered students who have “Never Attended” a course. Those students will be administratively withdrawn from that course. However, after the time period in the previous paragraphs, if a student stops attending a class or wants or needs to withdraw, for any reason, it is the student’s responsibility to take action to withdraw from the course. Students must complete and submit the appropriate Tri-C form by the established withdrawal deadline.

Tri-C is required to ensure that students receive financial aid only for courses that they attend and complete. Students reported for not attending at least one of their registered courses will have all financial aid funds held until confirmation of attendance in registered courses has been verified. Students who fail to complete at least one course may be required to repay all or a portion of their federal financial aid funds and may be ineligible to receive future federal financial aid awards. Students who withdraw from courses prior to completing more than 60 percent of their enrolled class time may be subject to the required federal refund policy.

If illness or emergency should necessitate a brief absence from class, students should confer with instructors upon their return. Students having problems with coursework due to a prolonged absence should confer with the instructor or a counselor.

IV. LEARNING OUTCOMES ASSESSMENT

Occasionally, in addition to submitting assignments to their instructors for evaluation and a grade, students will also be asked to submit completed assignments, called ‘artifacts,’ for assessment of course and program outcomes and the College’s Essential Learning Outcomes (ELOs). The artifacts will be submitted in Blackboard or a similar technology. The level of mastery of the outcome demonstrated by the artifact DOES NOT affect the student’s grade or academic record in any way. However, some instructors require that students submit their artifact before receiving their final grade. Some artifacts will be randomly selected for assessment, which will help determine improvements and support needed to further student success. If you have any questions, please feel free to speak with your instructor or contact the Learning Outcomes Assessment office.

V. CONCEALED CARRY STATEMENT

College policy prohibits the possession of weapons on college property by students, faculty and staff, unless specifically approved in advance as a job-related requirement (i.e., Tri-C campus police officers) or, in accordance with Ohio law, secured in a parked vehicle in a designated parking area only by an individual in possession of a valid conceal carry permit.

As a Tri-C student, your behavior on campus must comply with the student code of conduct which is available on page 29 within the Tri-C student handbook, available athttp://www.tri-c.edu/student-resources/documents/studenthandbook.pdf You must also comply with the College’s Zero Tolerance for Violence on College Property available athttp://www.tri-c.edu/policies-and-procedures/documents/3354-1-20-10-zero-tolerance-for-violence-policy.pdf

Outcomes

Course Outcome(s):

Use models to understand place-value and the base-ten number system.
Objective(s):
1. Determine whether sets are finite or infinite.
2. Find the union, intersection, complement, difference, and Cartesian product of a given pair of sets.
3. Draw Venn diagrams to solve applications involving sets.
4. Order whole numbers.
5. Identify features of number systems that are included in our system.
6. Express Egyptian, Roman, Babylonian, and Mayan numerals in our numeration system.
7. Express numbers in expanded form.
8. Convert numbers to different bases.

Course Outcome(s):
Represent and solve problems involving addition, subtraction, multiplication, and division of whole numbers and understand and apply properties of operations.

Objective(s):
1. Rewrite expressions using a single exponent.
2. Use the order of operations to simplify expressions.
3. Use the properties of addition, subtraction, multiplication, and division to calculate the sum, difference, product, and quotient of whole numbers.

Course Outcome(s):
Compute with numbers using mental math, estimation, calculators, and paper and pencil algorithms.

Objective(s):
1. Estimate calculations of whole numbers.
2. Estimate by rounding.
3. Use the order of operations with a calculator to simplify expressions.
4. Use algorithms to solve problems in base 10 and other bases.

Course Outcome(s):
Use factors, multiples, prime numbers, and prime factorization to solve problems.

Objective(s):
1. Express numbers as a product of primes.
2. Determine if a number is divisible by another number.
3. Find the prime factorization of a number.
4. Determine if a number is a prime or composite.
5. Find the number of factors a number contains.
6. Find the greatest common factor.
7. Find the least common multiple.

Course Outcome(s):
Understand representations of fractions and use algorithms to compute with fractions.

Objective(s):
1. Find the simplest form of fractions.
2. Order fractions.
3. Find fractions between two fractions.
4. Express mixed numbers as improper fractions and vice versa.
5. Use properties of addition, subtraction, multiplication, and division to calculate the sum, difference, product, and quotient of fractions.
6. Estimate calculations with fractions.

Course Outcome(s):
Use algorithms to compute with decimals and percents and use ratios and proportions to represent relationships.

Objective(s):
1. Express numbers in decimal form.
2. Order decimals.
3. Estimate calculations of decimals.
4. Round decimals.
5. Use properties of addition, subtraction, multiplication, and division to calculate the sum, difference, product, and quotient of decimals.
6. Convert between standard and scientific notation.
7. Calculate numbers using scientific notation.
8. Change forms between decimals, percents, and fractions.
9. Write equivalent ratios.
10. Solve proportions.
11. Solve percent application problems.

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**Course Outcome(s):**
Use algorithms to compute with integers.

**Objective(s):**
1. Use the properties of addition, subtraction, multiplication, and division to calculate the sum, difference, product, and quotient of integers.
2. Convert between standard and scientific notation using negative exponents.
3. Calculate numbers using scientific notation with negative exponents.
4. Order integers.

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**Course Outcome(s):**
Apply operations on rational and real numbers, solve equations, and analyze functions.

**Objective(s):**
1. Use the properties of addition, subtraction, multiplication, and division to calculate the sum, difference, product, and quotient of rational numbers.
2. Order rational numbers.
3. Determine if decimals represent rational or irrational numbers.
4. Simplify radicals.
5. Solve equations and inequalities using algorithms.
6. Determine whether sequences are arithmetic or geometric.
7. Express relationships using function notation.
8. Identify the domain, codomain, and range of a function.
9. Plot coordinates.
10. Graph linear, quadratic, exponential, cubic, and step functions.
11. Analyze graphs to predict what type of function produces it.
12. Use the vertical line test to determine if a graph is a function.

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**Course Outcome(s):**
Apply a variety of strategies to solve problems that arise in mathematics and other fields.

**Essential Learning Outcome Mapping:**
Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

**Objective(s):**
1. Use and apply the strategies of guess and test, draw a picture, use a variable, look for a pattern, and make a list.
2. Use and apply the strategies of solve a simpler problem, draw a diagram, use direct reasoning, and use indirect reasoning.
3. Use and apply the strategies of use properties of numbers, solve an equivalent problem, work backwards, use cases, and solve an equation.

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**Methods of Evaluation:**
1. Periodic exams
2. Quizzes
3. Homework
4. Cooperative group work
5. Presentation
6. Journal
7. Calculator/computer application problems
8. Comprehensive final exam
Course Content Outline:

1. Sets and numeration
   a. Sets
   b. Finite and infinite sets
   c. Operations on sets
   d. Numeration systems
      i. Egyptian
      ii. Roman
      iii. Babylonian
      iv. Mayan
      v. Hindu-Arabic
      vi. non-decimal

2. Whole numbers
   a. Numbers and numerals
   b. Ordering whole numbers
   c. Addition, subtraction, multiplication, division, and their properties
   d. Exponents
   e. Order of operations
   f. Estimation
   g. Using a calculator
   h. Algorithms for addition, subtraction, multiplication, and division
      i. Algorithms in other bases

3. Number theory
   a. Primes and composites
   b. Tests for divisibility
   c. Counting factors
   d. Greatest common factor
      i. Set intersection method
      ii. Prime factorization method
   e. Least common multiple
      i. Set intersection method
      ii. Prime factorization method
      iii. Build-up method

4. Fractions
   a. Concept of fraction
   b. Ordering fractions
   c. Addition, subtraction, multiplication, division, and their properties
   d. Estimation

5. Decimals, ratio, proportions, and percent
   a. Decimals
   b. Ordering decimals
   c. Estimation
   d. Algorithms for operating with decimals
   e. Scientific notation
   f. Classifying repeating decimals
   g. Ratio
   h. Proportion
      i. Converting percents
   j. Estimation using fraction equivalents
   k. Solving percent problems

6. Integers
   a. Integers and the integer number line
   b. Addition, subtraction, multiplication, division, and their properties
   c. Negative exponents and scientific notation
   d. Ordering integers

7. Rational numbers and real numbers
   a. Rational numbers
   b. Addition, subtraction, multiplication, division, and their properties
c. Ordering rational numbers
d. Real numbers
e. Rational exponents
f. Introduction to algebra
g. Relations
h. Functions
i. Function notation
j. Representations of functions
k. Cartesian coordinate system
l. Graphs of linear, quadratic, exponential, cubic, and step functions

8. Problem solving strategies
   a. Guess and test
   b. Draw a picture
   c. Use a variable
   d. Look for a pattern
   e. Make a list
   f. Solve a simpler problem
   g. Draw a diagram
   h. Use direct reasoning
   i. Use indirect reasoning
   j. Use properties of numbers
   k. Solve an equivalent problem
   l. Work backwards
   m. Use cases
   n. Solve an equation

Resources


"Ohio Journal of School Mathematics"

"Principles and Standards for School Mathematics"

"Teaching Children Mathematics; Mathematics Teaching in the Middle School; Mathematics Teacher; and Journal for Research in Mathematics Education"

Resources Other