

Quinsigamond Community College School of Math, Science, & Engineering

Instructor's Information

Instructor: Professor XX (she/her/hers)
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Course Information

Course: MAT 111 Mathematics for Educators I – Section XX
Meets: Mondays and Wednesdays from 8:00am – 9:15am
Room: 179A
Credits: 3 credits
Semester: Fall 2024

Course Description

This course focuses on the critical Mathematical concepts necessary for students who are pursuing the Elementary Education Transfer Option in the General Education-Associate in Arts degree program. Students construct and apply problem solving techniques to solve problems, apply arithmetical operations on integers, rational numbers and decimals, and develop an understanding of mathematical relationships using equations, draw conclusions based upon geometric pattern and interpret data. Students construct geometric patterns and graphical data into algebraic equations; construct a geometric or graphical model given an algebraic equation. Instructor modeling is an integral component of the course.

Restriction: Restricted to General Studies – Elementary Education Transfer Option and ECE Program students

Prerequisites

MAT 099 with a grade of “C” or higher or appropriate placement score

Required Textbook/Materials/Website

Textbook: *A Problem Solving Approach to Mathematics for Elementary School Teachers*, by Billstein, Libeskind, & Lott, Pearson Pub., 13th edition, © 2020

Materials: *Mathematics Activities for Elementary School Teachers*

Website: Access to www.mymathlab.com

Note to Instructors: Various math manipulatives are available for classroom use. They are housed in the Math Center 206 HLC and can be borrowed anytime that the Math Center is open.

Student Learning Outcomes

Upon completion of this course students will be able to:

1. Apply deductive and inductive reasoning appropriately to solve mathematical problems.
2. Apply set theory to perform operations with sets and model them using Venn diagrams.
3. Convert numbers from one base to another and explore historical contexts of different Numeration Systems
4. Perform arithmetic operations on whole numbers, integers, rational numbers, and real numbers.
5. Use divisibility rules to decompose numbers and find the least common multiple and greatest common divisor.
6. Solve equations and evaluate functions.
7. Use graphical data and algebra to solve application problems.
8. Use math manipulatives to describe, visualize, and model math concepts.

Course Topics and Required Assignments/Readings

This course covers the following textbook topics.

An Introduction to Problem Solving

- Mathematics and Problem Solving
- Explorations with Patterns

Introduction to Logic and Sets

- Reasoning and Logic: An Introduction
- Describing Sets
- Other Set Operations

Numeration Systems and Whole Number Operations

- Numeration Systems
- Addition of Whole Numbers
- Subtraction of Whole Numbers
- Multiplication of Whole Numbers
- Division of Whole Numbers

Number Theory

- Divisibility
- Prime and Composite Numbers
- Greatest Common Divisor and Least Common Multiple

Integers

- Addition and Subtraction of Integers
- Multiplication and Division of Integers

Rational Numbers and Proportional Reasoning

- The Set of Rational Numbers
- Addition Subtraction, and Estimation with Rational Numbers
- Multiplication, Division, and Estimation with Rational Numbers
- Proportional Reasoning

Decimals, Percents, and Real Numbers

- Terminating Decimals
- Operations on Decimals
- Repeating Decimals

- Percents
- Real Numbers

Algebraic Thinking

- Variables
- Equals Relation and Equations
- Functions
- Equations in a Cartesian Coordinate System

Instructional Objectives

This course covers the following instructional objectives.

- Construct and apply problem-solving techniques to solve problems and assess the appropriateness of using one form of problem-solving technique over another.
- Understand the structure of sets and their relationship to mathematical concepts.
- Understand set operations and properties.
- Use Venn diagrams and Cartesian products to solve problems.
- Understand the role that early numeration systems have in mathematics today.
- Understand place value and use expanded form to write whole number and decimals.
- Use expanded form to model/describe math manipulatives.
- Categorize and convert numeration systems of the past and present.
- Translate one base system to another.
- Understand order of operations.
- Demonstrate understanding of whole number addition properties such as commutative property and associative property.
- Demonstrate understanding of whole number multiplication properties such as distributive property, multiplicative identity, associative property, and commutative property.
- Understand multiple algorithms for addition and subtraction, and use manipulatives, including base-ten blocks.
- Understand properties of exponents.
- Understand multiple algorithms for multiplication and division, and use manipulatives, including base-ten blocks.
- Demonstrate an understanding of techniques of mental computation and estimation for addition, subtraction, multiplication, and division.
- Understand and use divisibility rules.
- Understand prime and composite numbers.
- Demonstrate understanding of greatest common divisor and least common multiple.
- Understand representation, models, and properties of integers.
- Apply arithmetical operations on integers.
- Understand the set of rational numbers.
- Understand and use models for equivalent fractions.
- Understand the denseness property for rational numbers.
- Demonstrate an understanding of addition, subtraction, and estimation of rational numbers.
- Use properties of exponents for rational numbers.
- Demonstrate an understanding of multiplication and division of rational numbers.
- Use ratios and proportional reasoning.

- Read and write decimals using base-ten numerals.
- Understand finite and repeating decimals.
- Perform arithmetical operations on decimals.
- Use percents for applications, including interest.
- Convert between percents, fractions and decimals.
- Demonstrate an understanding of square roots, including irrational numbers.
- Describe mathematical relationships using equations.
- Solve equations and use algebra for problem solving.
- Draw conclusions based upon geometric patterns and/or data.
- Demonstrate an understanding of functions.
- Interpret data, geometric patterns and graphical data into algebraic equations.
- Become familiar with the Common Core State Standards for Mathematics (CCSS) and the National Teachers of Mathematics (NCTM) publication *Principles and Standards of School Mathematics* and the NCTM journal *Teaching Children Mathematics*.

Grading Breakdown

20%	Homework
10%	Quizzes
10%	Attendance/Other
40%	Exams
20%	Project

Grade	Range	Grade	Range	Grade	Range
A	95 – 100	B –	80 – 82	D +	67 – 69
A –	90 – 94	C +	77 – 79	D	63 – 66
B +	87 – 89	C	73 – 76	D –	60 – 62
B	83 – 86	C –	70 – 72	F	0 – 59

Attendance Policy

Students are expected to attend all classes for the entire period. Attendance will be taken in every class. If you are absent from class, proper documentation will excuse your absence.

Teaching Procedures

Most classes will be a combination of lectures, group activities, and in-class assignments. You will be given homework assignments to be completed outside of class. Occasionally, a quiz or exam will be given in class.

Purpose and Goals of the Course

The goals of the course are (1) to provide students with a solid mathematical background necessary to enter the teaching profession, and (2) to prepare students for the Massachusetts Test of Educator Licensure (MTEL) required by the Commonwealth of Massachusetts.

Diversity, Equity, and Inclusion Statement for the School of Math & Science

The School of Math and Science is motivated to teach and learn from the diverse community we have at QCC. In Science, Technology, Engineering, and Mathematics (STEM), it is advantageous to approach problems from multiple perspectives. The power of diversity, equity and inclusion allows us to persevere and overcome challenges.

The faculty of the School of Math and Science pledge to help students meet the demands of STEM regardless of race/ethnicity, gender identity and expression, sexual orientation, faith, abilities/disabilities, age, socioeconomic background, political leaning, ancestry, national origin, home language and all other identities. We are dedicated to nurturing a culture of collaboration, mutual respect and understanding; and to empowering members of our community to embrace their full potential.

Accessibility Statement

Quinsigamond Community College is committed to providing access and inclusion for all persons with disabilities. Students who require an accommodation in this course should notify the professor as soon as possible. Students are responsible for forwarding the Accommodation Letter to the professor (via email or hard copy). Students may request accommodations at any time during the semester, which begin upon receipt (accommodations are not retroactive). Please discuss any barriers which may arise during the semester with your professor or coordinator in the Student Accessibility Services office.

Contact Information for Student Accessibility Services (SAS):

Call: 508-854-4471

Sorenson Video Phone: 508-502-7647

Email: disabilityservices@qcc.mass.edu

Services for Veterans

If you are a veteran of the US Armed Forces, please visit the Veteran Affairs Office located in 258A (Administration Building) or contact them at veteranaffairs@qcc.mass.edu.

Academic Honesty and Plagiarism

Our purpose of education is to seek the truth; this work requires trust and honesty between teacher and student. If we are not honest about what we know and don't know, our learning will always be impaired. Because our teaching and learning depends on this honest communication, we expect all students to understand what plagiarism is and why it is unacceptable.

Plagiarism means taking someone else's ideas or words and presenting them as one's own. The offense can take many forms including cheating on a test, passing in a paper taken from the Internet or from another student, or failing to properly use and credit sources in an essay. Sometimes the issue is subtle, involving getting too much help on an assignment from someone else. In every instance, plagiarism means cheating both oneself and the owner of the source. Since cheating sabotages a student's learning experience, consequences range from no credit for the assignment to failure for the course and possible expulsion from the college.

The penalty for getting caught cheating in this course is a failure of the quiz or test, or failure of the entire course. This is solely at the discretion of the instructor.

For further information concerning plagiarism, refer to the QCC Student Handbook.

Math Center

The Math Center provides free, drop-in tutoring assistance for students in any QCC mathematics course. Located on the second floor of the Harrington Learning Center (HLC), the Math Center is a welcoming place where students have the opportunity to work collaboratively with tutors and classmates. Students can work intensively to improve their mathematical skills or simply drop by to ask a few questions. In addition to tutoring, the Math Center houses various math-related resources, and computers and software for math coursework. Visit their website for details and the semester schedule: <https://www.qcc.edu/services/tutoring/math-center>

Assignment & Test Schedule

- **Homework:** MyMathLab, Textbook, and *Mathematics Activities for Elementary School Teachers*
- **Two/Three Exams:** <suggest including related questions from MTEL>
- **Quizzes**
- **Essay:** Write an essay about your previous math experiences and general perceptions about mathematics. (quiz grade)
- **Group Presentations on Numeration Systems** (use textbook to prepare) (quiz grade)
- **Project:** Students will be given an assignment, and the class will attend a library research information session as part of a written research project and presentation.
- **Additional Reading Assignments:** <example> Sweetland, Julie, and Fogarty Meghann. "Prove It! Engaging Teachers as Learner to Enhance Conceptual Understanding," Teaching Children Mathematics September 2008.