

**Quinsigamond Community College
School of Math and Science**

Instructor's Information:

Instructor: <Professor John Smith>
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Course Information:

Course: MAT 111 Mathematics for Educators I – Section ##
Meets on: <Mondays, Wednesdays, Fridays from 8:00am – 8:50am>
Credits: 3 credit hours
Semester: <Fall 2019>

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.

Pre-requisite:

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

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

Required Textbook/Materials/Website:

Textbook: *A Problem Solving Approach to Mathematics for Elementary School Teachers*, by Billstein, Libeskind, and Lott, Pearson Publishing, 13th edition, © 2020
Materials: *Mathematics Activities for Elementary School Teachers*
Website: Access to www.mymathlab.com

Student Learning Outcomes & Instructional Objectives:

This course is designed to achieve the following student outcomes and 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 had on 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*.

Teaching Procedures:

Most classes will be a combination of lecture, group activities, and in-class assignments. You will be given homework assignments, projects, and presentation topics to be completed outside of class, with due dates/times. There will occasionally be a quiz or exam 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 for Educator Licensure (MTEL) required by the State of Massachusetts.

Course Topics & Required Assignments/Readings:

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

Additional Reading Assignments: <example> Sweetland, Julie, and Fogarty Meghann. “Prove It! Engaging Teachers as Learner to Enhance Conceptual Understanding,” Teaching Children Mathematics September 2008.

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.

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.

Grading Breakdown:

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

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 during every class, and counts towards your final course grade. If you are absent from class, a doctor's note will excuse your absence.

Disability Statement:

If you have a disability which may require an accommodation, please notify me as soon as possible. You are responsible for forwarding your Accommodation Letter to me and discussing arrangements for this course. Your accommodations for this course begin upon my receipt of your Accommodation Letter; accommodations are not retroactive. You may request accommodations at any time during the semester, but instructors must be provided with reasonable notice prior to exams or deadlines.

Disability Services works to promote access to ensure an accessible college experience for students. If you have further questions, contact Disability Services. All discussions are confidential.

Contact Information for Disability Services & Assistive Technology:

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 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 in the classroom 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 the 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.

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