

# Quinsigamond Community College School of Math, Science, & Engineering

## Instructor's Information

Instructor: Professor XX (she/her/hers)  
Office: 200A  
Email: xxxxx@qcc.mass.edu  
Telephone: 508-854-xxxx

## Course Information

Course: MAT 112 Mathematics for Educators II – Section XX  
Meets: Mondays and Wednesdays from 8:00am – 9:15am  
Room: 179A  
Credits: 3 credits  
Semester: Fall 2024

## Course Description

This course continues the comprehensive focus on the critical Mathematics concepts necessary for students who are pursuing an Early Childhood and/or General Studies Elementary Education degree. Students develop an understanding of the principles of Euclidean geometry and use them to prove theorems. In addition, students apply Euclidean geometry to analyze the characteristics and properties of two and three-dimensional shapes, coordinate geometry, and transformations. Fundamental principles of probability and statistics explored. Students develop a deep level of understanding of geometry, probability, and statistics in order to become successful elementary and middle school teachers. Instructor modeling is an integral component of the course.

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

## Prerequisites

MAT 111 Mathematics for Educators I

## Required Textbook/Materials/Website

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

Materials: *Mathematics Activities for Elementary School Teachers*

Website: Access to [www.mymathlab.com](http://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. Solve problems using probabilities, odds, expected value, permutations, and combinations.
2. Design experiments to collect data and use it to construct graphs.
3. Compute measures of central tendency and variation.
4. Apply Euclidean geometry to analyze the characteristics and properties of two and three-dimensional shapes, coordinate geometry, and transformations.
5. Find surface areas and volumes of three-dimensional figures.
6. Convert from, to, and between imperial and metric measurements.
7. Use math manipulatives to describe, visualize, and model math concepts.

## Course Topics and Required Assignments/Readings

This course covers the following textbook topics.

### Probability

- Determining Probabilities
- Multistage Experiments and Modeling Games
- Simulations and Applications in Probability
- Permutations and Combinations in Probability

### Data Analysis/Statistics: And Introduction

- Designing Experiments/Collecting Data
- Displaying Data: Part I
- Displaying Data: Part II
- Measures of Central Tendency and Variation

### Introductory Geometry

- Basic Notions
- Curves, Polygons, and Symmetry
- More About Angles
- Geometry in Three Dimensions

### Congruence and Similarity with Constructions

- Congruence Through Constructions
- Additional Congruence Theorems
- Additional Constructions
- Similar Triangles and Other Similar Figures

### Area, Pythagorean Theorem, and Volume

- Linear Measure
- Areas of Polygons and Circles
- The Pythagorean Theorem, Distance Formula, and Equation of a Circle
- Surface Areas
- Volume, Mass, and Temperature

### Transformations

- Translations, Rotations, and Tessellations
- Reflections and Glide Reflections
- Dilations 935

## 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.

## 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 probability of a certain event and the probability of an impossible event.
- Understand and explain experimental or empirical probabilities versus theoretical probabilities.
- Solve problems using probabilities.
- Understand simulations in probability.
- Understand and explain odds.
- Understand and explain expected value.
- Compute permutations and combinations.
- Use permutations and combinations in probability problems.
- Design experiments to collect data.
- Understand variability in data and how it relates to the study of statistics.
- Understand the difference between a survey population and a sample population.
- Understand biased questions.
- Understand data analysis methods and interpretation across grade levels.
- Understand the difference between categorical and numerical data.
- Construct simple plots and graphs.
- Construct histograms and bar graphs.
- Construct stem and leaf plots.
- Construct circle graphs.
- Construct line graphs.
- Construct scatterplots for two variables.
- Understand the relationship between a pair of variables using a scatterplot.
- Compute the variance and standard deviation.
- Compute the mean, median, mode.
- Construct boxplots to compare sets of data.
- Understand and explain the normal distribution.
- Compute percentiles, quantiles, and deciles.
- Understand and explain misuses and abuses of statistics.
- Understand and explain basic terms of geometry.
- Name and construct basic geometrical shapes.
- Know attributes and properties of geometrical shapes and relationship between them.
- Know names, classifications, and measurement of angles.
- Construct and define simple, closed, and convex curves including polygons.
- Name and classify triangles and quadrilaterals.
- Classify polygons.
- Understand and explain symmetries and their relation to planar figures.
- Understand and explain vertical, supplementary, and complementary angles.

- Understand and explain parallel lines and angles associated with them.
- Find measures of interior and exterior angles of polygons.
- Draw three dimensional shapes.
- Understand and explain geometric constructions leading to the SSS, SAS, and HL congruence properties.
- Construct isosceles triangles.
- Construct circles circumscribing triangles and quadrilaterals.
- Understand and explain geometric constructions leading to the ASA and AAS congruence properties.
- Understand and explain properties of quadrilaterals.
- Construct parallel lines, angle bisectors, and perpendicular lines.
- Know the angle bisector properties.
- Understand and explain similar figures.
- Construct midsegments of triangles and quadrilaterals.
- Understand and explain transformation of the plane, isometry and its properties, translations, rotations and their constructions.
- Construct translations in the coordinate plane.
- Construct rotational symmetries.
- Understand and explain reflection and glide reflections.
- Understand and explain dilations.
- Understand and explain tessellations with regular and irregular shapes.
- Convert unit measurements in English system
- Convert unit measurements in metric system.
- Compute perimeter and circumference.
- Compute areas of polygons and circles.
- Use Pythagorean theorem to find sides of right triangles.
- Use distance formula to find the distance between two points in the coordinate plane.
- Understand and explain the equation of a circle.
- Find surface areas of right prisms, right circular cylinders, right regular pyramids, right circular cones and spheres.
- Convert English measures of surface area.
- Convert metric measures of surface area.
- Find volumes of prisms, cylinders, pyramids, cones, and spheres.
- Convert metric measures of volume.
- Convert English measures of volume.
- Understand and explain measures of mass and capacity and temperature.
- Formulate a reasonable estimation in terms of unit measurement and convert unit measurement.
- Calculate units of measurement based upon a given verbal or graphical description.
- Use measurement instruments, units and procedures for problems involving length and area.
- 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.

## 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](mailto: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](mailto: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**
- **Discovery/Hands-on Activities:** <such as discovering  $\pi$ > (quiz grade); <use math manipulatives, including folding geometric shapes>
- **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.