Quinsigamond Community College
School of Math and Science

Instructor's Information:
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Course Information:
Course: MAT 112 Mathematics for Educators II – Section ##
Meets on: <Mondays, Wednesdays, Fridays from 8:00am – 8:50am>
Credits: 3 credit hours
Semester: <Fall 2019>

Course Description:
This course continues the comprehensive focus on the critical Mathematics concepts necessary for students who are pursuing and 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.

Pre-requisite:
MAT 111

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 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*.

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:

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

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 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

Discovery/Hands-on Activities: <such as discovering π> (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.

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.