

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 123 College Mathematics I: Pre-Calculus – Section XX
Meets: Mondays and Wednesdays from 11:00am – 12:15pm
Room: 177A
Credits: 3 credits
Semester: Fall 2024

Course Description

This course focuses on the knowledge and skills necessary for advanced mathematics. Students expand binomial expressions using the binomial theorem; solve non-linear, and rational inequalities and write their solutions using interval notation; determine and write linear equations in several forms; explain the concept of function; graph functions using symmetry test; recognize and graph functions, including constant, linear, quadratic, polynomial, rational, exponential, and logarithmic functions; use function transformation techniques; perform composition and arithmetic operations on functions; find and graph inverses of functions; use properties of logarithms; and solve logarithmic and exponential equations.

Prerequisites

MAT 100 College Algebra or appropriate placement score

Required Textbook/Materials/Website

Textbook: *Algebra and Trigonometry*, by Blitzer, 7th edition, Pearson © 2022
Materials: Graphing calculator (recommended)
Website: Required access to www.mymathlab.com

Student Learning Outcomes

Upon completion of this course, students will be able to:

1. Apply Pascal's Triangle and/or the Binomial Theorem to expand binomials $(x + y)^n$.
2. Graph linear, quadratic, polynomial, exponential, and logarithmic functions.
3. Specify a function's domain, range, extreme values, and intervals when a function increases, decreases, or remains constant.
4. Solve and graph non-linear and rational inequalities and write their solutions as intervals.

5. Apply transformations of functions.
6. Perform operations on functions and evaluate the resultant functions.
7. Apply properties of logarithms to condense, expand, and change from one base to another to solve logarithmic and exponential equations.

Course Topics & Required Section Readings/Assignments

Sequences, Induction, and Probability

- The Binomial Theorem

Function and Graphs

- Basics of Functions and Their Graphs
- More on Functions and Their Graphs
- Linear Functions and Slope
- More on Slope
- Transformations of Functions
- Combinations of Functions; Composite Functions
- Inverse Functions

Polynomial and Rational Functions

- Quadratic Functions
- Polynomial Functions and Their Graphs
- Dividing Polynomials; Remainder and Factor Theorems
- Zeros of Polynomial Functions
- Rational Functions and Their Graphs
- Polynomial and Rational Inequalities

Exponential and Logarithmic Functions

- Exponential Functions
- Logarithmic Functions
- Properties of Logarithms
- Exponential and Logarithmic Equations
- Exponential Growth and Decay; Modeling Data

Instructional Objectives

- Explain the development of the binomial theorem and solve problems using binomial coefficients.
- Use Pascal's triangle.
- Solve nonlinear and rational inequalities.
- Graph the solutions of inequalities using open, closed, half-open, and infinite interval notation.
- Make an accurate graph of a given equation in x and y ; use symmetry tests.
- Discuss the meaning of variable and the domain of a variable.
- Explain the meaning of function in terms of domain, range and one-to-one relation.
- Explain the meaning of identity function, and identify a constant function, even function, and odd function.
- Given the graph of a function, state the interval(s) over which it is increasing, decreasing, and constant.

- Graph a given function.
- Demonstrate how to shift a graph horizontally and vertically.
- Demonstrate how to reflect and/or stretch a graph.
- Recognize the equation of a linear function.
- Demonstrate and explain the meaning of, and how to determine, the slope of a line.
- Write the standard form of a given linear equation in x and y .
- Find the equation of a line using point-slope and slope-intercept forms.
- Demonstrate how to add, subtract, multiply, and divide functions.
- Determine the specified composite function of two given functions.
- Determine the inverse function of a given one-to-one function.
- Determine if a given function is one-to-one.
- Identify the form of an equation of a quadratic function.
- Graph a given quadratic function.
- Find the maximum or minimum value of a given quadratic function.
- Employ synthetic division where appropriate.
- Sketch the graph of a polynomial function, using transformations, the leading coefficient test and the zeros (multiplicity included) of the polynomial.
- Sketch the graph, including all intercepts and linear asymptotes, of a given rational function.
- Evaluate exponential functions.
- Sketch the graph of a given exponential function.
- Use and solve models for exponential functions.
- Evaluate logarithmic functions.
- Identify logarithmic and exponential functions as inverses of one another.
- Sketch the graph of a given logarithmic function.
- Use the properties of logarithms to expand and condense logarithmic expressions.
- Change logarithmic bases using appropriate formulas.
- And solve logarithmic and exponential equations.

Optional:

- Demonstrate the remainder and factor theorems and the rational root theorem.
- Demonstrate the fundamental theorem of algebra.
- Use Descartes' rule of signs.

Grading Breakdown

20%	Homework
10%	Quizzes
10%	<Attendance or Project & Presentation>
35%	Exams
25%	Comprehensive Final Exam

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

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.

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.

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 & QCC Math YouTube Channel

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>

For further help, visit the QCC Math YouTube channel. This channel has a playlist specifically for this course, with many short videos created with students like you in mind, covering many of the topics in this course: <https://www.youtube.com/user/QCCmath>

Assignment & Test Schedule

<list all assignments, quizzes, and exam dates>