

Quinsigamond Community College
School of Math and Science

Instructor's Information:

Instructor: <Professor XXXX>
Office: <200A>
Email: <username@qcc.mass.edu>
Telephone: 508-854-2400

Course Information:

Course: MAT 233 Calculus I – Section ##
Meets on: <Mondays, Wednesdays, Fridays from 7:45am – 8:55am>
Credits: 4 credit hours
Semester: <Fall2021>

Course Description:

This course begins with a review of functions and functional notation. After introducing the limit and continuity theorems on an intuitive basis, the study of differentiation begins. Typical derivative formulae are applied to polynomial, rational, trigonometric, implicit, logarithmic, exponential, and inverse trigonometric functions. Application topics include extrema, related rates, curve sketching, and velocity and acceleration. The basic rules of integration and the substitution method are introduced along with Riemann Sums and the Fundamental Theorem of Calculus.

Pre-requisite:

MAT 124 or appropriate placement score

Required Textbook/Materials/Website:

Textbook: *Calculus: Early Transcendentals* by Briggs; Pearson, 3rd edition, © 2019
Materials: Graphing calculator
Website: Access to www.mymathlab.com

Student Learning Outcomes & Instructional Objectives:

This course is designed to achieve the following student outcomes and objectives:

- Define inverse, exponential, logarithmic, and inverse trigonometric functions.
- Use inductive and deductive reasoning.
- Evaluate the limits of a function as x approaches a point using numerical, graphical and analytical strategies.
- Evaluate the limits of a function as x approaches positive or negative infinity using numerical, graphical and analytical strategies.
- Calculate one-sided limits.
- Define continuity.
- Test a function for continuity.
- Identify values for x for which a function is discontinuous.
- Categorize a discontinuity as removable or singular.

- State the Intermediate Value Theorem and use it to prove the existence of roots of polynomials.
- Compute the derivative using the limit definition and the difference-quotient rule.
- Write the equation of the tangent line to a curve at a particular point.
- Discuss the connection between continuity and differentiability.
- Differentiate constant, polynomial functions as well as the sum & differences of functions.
- Define and correctly use the product and quotient rules.
- Differentiate trigonometric functions.
- Compute higher derivatives.
- Determine average and instantaneous velocity.
- Define instantaneous velocity as the first derivative of the position function.
- Define acceleration as the second derivative of the position function.
- Solve appropriate word problems using position, velocity and acceleration and their respective derivatives.
- Correctly recognize situations where the chain rule should be used and apply the rule correctly.
- Implicitly differentiate functions.
- Differentiate logarithmic and exponential functions.
- Differentiate inverse trigonometric functions.
- Differentiate inverse functions in general.
- Set up and solve equations involving related rate application problems.
- Define and identify where functions are increasing and decreasing using the first derivative test.
- Determine the local maxima and minima of a function using the first derivative test.
- Identify the absolute maximum and minimum of a function if they exist.
- Define and identify when functions are concave up and concave down using the second derivative test.
- Identify the inflection points of a function.
- Using information obtained from the first and second derivative tests, sketch the graph of a function.
- Set up and solve equations involving optimization application problems.
- Calculate limits using L'Hôpital's rule.
- State and apply Rolle's Theorem.
- State and apply the Mean Value Theorem.
- Calculate differentials and use them to compute error propagation.
- Use basic integration rules to find antiderivatives (power rule, trigonometric functions, exponential, logarithmic, inverse trigonometric functions).
- Use sigma notation to write and evaluate a sum.
- Understand the definition of a Riemann sum.
- Evaluate a definite integral using the Fundamental Theorem of Calculus.
- Employ the Second Fundamental Theorem of Calculus correctly using dummy variables.
- Compute definite and indefinite integrals using the Substitution Method.

Teaching Procedures:

Most classes will be a combination of lecture, group activities, and in-class assignments. You will be given homework assignments to be completed outside of class, with due dates/times. There will occasionally be a quiz or exam given in class.

Course Topics & Required Assignments/Readings:

Limits

- The Idea of Limits
- Definitions of Limits
- Techniques for Computing Limits
- Infinite Limits
- Limits at Infinity
- Continuity
- Precise Definitions of Limits

Derivatives

- Introducing the Derivative
- Rules of Differentiation
- The Product and Quotient Rules
- Derivatives of Trigonometric Functions
- Derivatives as Rates of Change
- The Chain Rule
- Implicit Differentiation
- Derivatives of Logarithmic and Exponential Functions
- Derivatives of Inverse Trigonometric Functions
- Related Rates

Applications of the Derivative

- Maxima and Minima
- Mean Value Theorem
- What Derivatives Tell Us
- Graphing Functions
- Optimization Problems
- L'Hôpital's Rule
- Antiderivatives

Integration

- Approximating Areas under Curves
- Definite Integrals
- Fundamental Theorem of Calculus
- Working with Integrals
- Substitution Rule

Assignment & Test Schedule:

<list all assignments, quizzes, & exam dates>

Grading Breakdown:

25%	Homework
15%	Quizzes
10%	Attendance
20%	Exams
30%	Final Exam

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

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

Contact Information for Student Accessibility Services:

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.

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>