Quinsigamond Community College
School of Math and Science

Instructor's Information:
Instructor: \<Professor John Smith\>
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Course Information:
Course: MAT 231 Applied Calculus – Section ##
Meets on: \<Mondays, Wednesdays, Fridays from 8:00am – 8:50am\>
Credits: 3 credit hours

Course Description:
This course begins with a review of the basic concepts of functions and function 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, implicit, exponential and logarithmic functions. Application topics include extreme, related rates, biochemical reaction, cost-benefit analysis, growth and decay, maximizing revenue, elasticity of demand, inflation, amortization, drug concentration, drug reaction, and continuous probability models. The basic rules of integration and the substitution method are introduced along with Riemann Sums and the Fundamental Theorem of Calculus. This course is designed for students considering a major in business, pharmaceutical, social, and life sciences.

Pre-requisite:
MAT 123 or appropriate placement score

Required Textbook/Materials/Website:
Textbook: *Calculus with Applications,* Books a la Carte Plus MyMathLab Package, by Margaret Lial, Raymond Greenwell, and Nathan Ritchey, Pearson Publishing, 11th edition, © 2016. ISBN: 9780133886849
Materials: Scientific calculator
Website: Access to www.mymathlab.com

Student Learning Outcomes & Instructional Objectives:
This course is designed to achieve the following student outcomes and objectives:
- Apply calculus concepts to areas of business and economics, life sciences, social sciences, physical sciences
- Solve exponential and logarithmic functions
- Graph exponential and logarithmic functions
- Apply concepts of logarithms and exponentials to solve growth and decay as well as finance problems
- Understand the concept of limits graphically and algebraically
- Apply concepts of continuity to graphical and algebraic situations
- Determine the average and instantaneous rates of change

- Apply the definition of derivative to find slopes of tangent lines
- Graphically interpret the definition of derivative
- Utilize techniques of differentiation
- Apply the quotient and product rule to find derivatives of functions
- Apply the chain rule to determine the derivative of a function
- Determine the derivative of exponential functions
- Determine graphically and algebraically whether a function is increasing or decreasing
- Find the relative extrema of a function
- Apply concepts of higher derivatives to determine concavity
- Utilize techniques of integration to graphically represent a function
- Solve application problems utilizing concepts of absolute extrema
- Utilize graphical and algebraic concepts of derivatives and curve sketching to solve business application problems
- Use implicit differentiation to solve for the derivative of a function
- Use differentiation to solve related rate problems
- Apply the concepts of differentials to determine linear approximations to functions
- Determine the antiderivative of a function
- Solve for the integral using substitution
- Use the definite integral to determine the area of a function
- Apply the fundamental theorem of calculus
- Determine the area between two curves
- Approximate values of integrals using the trapezoidal rule and Simpson's rule
- Utilize integration by parts to find the integral of a function
- Determine the volume and average value of a function

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:

The Derivative
- Limits
- Continuity
- Rates of Change
- Definition of the Derivative
- Graphical Differentiation

Calculating the Derivative
- Techniques for Finding Derivatives
- Derivatives of Products and Quotients
- The Chain Rule
- Derivatives of Exponential Functions

Graphs and the Derivative
- Increasing and Decreasing Functions
- Relative Extrema
- Higher Derivatives, Concavity, and the Second Derivative Test
- Curve Sketching

Applications of the Derivative
- Absolute Extrema
- Applications of Extrema
- Further Business Applications: Economic Lot Size; Economic Order Quantity; Elasticity of Demand
- Implicit Differentiation
- Related Rates
- Differentials: Linear Approximation

Integration
- Antiderivatives
- Substitution
- Area and the Definite Integral
- The Fundamental Theorem of Calculus
- The Area Between Two Curves
- Numerical Integration

Assignment & Test Schedule:
<list all assignments, quizzes, & exam dates>

Grading Breakdown (Sample):
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 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