

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 235 Calculus III – Section ##
Meets on: <Mondays, Wednesdays, Fridays from 7:45am – 8:55am>
Credits: 4 credit hours
Semester: <Spring 2022>

Course Description:

This course covers conic sections, rotation of axis, plane curves, parametric equations, vectors; polar, cylindrical, and spherical coordinates and graphs; vector-valued functions, differentiation, and integration; functions of several variables, partial derivatives, gradients; applications of extrema of functions, Lagrange multipliers; multiple integrations; area, volume, center of mass, moment of inertia, change of variables, Jacobians; Green's divergence and Stokes' theorems. Students learn to use calculus to solve engineering and scientific problems. The course concludes with some elementary differential equations.

Pre-requisite:

MAT 234

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:

- Graph and analyze parametric equations.
- Evaluate derivatives of parametric equations.
- Plot polar equations using the Cartesian-to-polar method.
- Evaluate the slopes of the lines tangent to polar equations.
- Identify and graph the equation in rectangular and polar coordinates of the Ellipse, Parabola, and Hyperbola.
- Evaluate vector operations in terms of components in the plane and in three dimensions.
- Apply vectors to describe velocities and forces.
- Define Dot Products and Cross Products.
- Find the orthogonal projection of one vector onto another.
- Find parametric equations for lines and curves in space.

- Compute the derivative, definite, and indefinite integral of a Vector Valued Function.
- Use the derivative rules for Vector Valued Functions.
- Find the velocity and acceleration from position in two and three dimensions.
- Evaluate the length of curves.
- Calculate the curvature for vector valued functions.
- Find the Unit Tangent Vector and the Principal Unit Normal Vector.
- Find the equation of planes.
- Define and sketch Cylinders and Quadric Surfaces.
- Sketch and find level curves and level surfaces.
- Calculate the limit of a function of two and three variables.
- Evaluate partial derivatives and higher-order partial derivatives.
- Apply the chain rule with one and several independent variables.
- Evaluate directional derivatives and the gradient.
- Calculate the equation for tangent planes to surfaces.
- Solve maximum/minimum problems using the second derivative test.
- Apply the method of the Lagrange Multipliers with two and three independent variables.
- Evaluate double integrals over general regions.
- Calculate double integrals in polar coordinates.
- Evaluate triple integrals in cylindrical and spherical coordinates.
- Use integrals for mass calculations.
- Calculate the Jacobian of a transformation of two and three variables.
- Apply the Change of Variables in Multiple Integrals.
- Sketch vector fields.
- Evaluate line integrals.
- Use correctly the test for Conservative Vector Fields.
- Apply Green's Theorem in circulation form and flux form.
- Calculate the Divergence and Curl of a vector field.
- Evaluate Surface Integrals.
- Apply Stokes' Theorem.
- Apply the Divergence Theorem.

Teaching Procedures:

Most classes will be a combination of lecture, 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:

Parametric Equations

- Parametric Equations
- Polar Coordinates
- Calculus in Polar Coordinates
- Conic Sections

Vectors and Vector-Valued Functions

- Vectors in the Plane
- Vectors in Three Dimensions
- Dot Products
- Cross Products
- Lines and Curves in Space
- Calculus and Vector Valued Functions
- Motion in Space
- Length of Curves
- Curvature and Normal Vectors

Functions of Several Variables

- Planes and Surfaces
- Graphs and Level Curves
- Limits and Continuity
- Partial Derivatives
- The Chain Rule
- Directional Derivatives and the Gradient
- Tangent Planes and Linear Approximations
- Maximum/Minimum Problems
- Lagrange Multipliers

Multiple Integration

- Double Integrals and Rectangular Regions
- Double Integrals over General Regions
- Double Integrals in Polar Coordinates
- Triple Integrals
- Triple Integrals in Cylindrical and Spherical Coordinates
- Integrals for Mass Calculations
- Change of Variables in Multiple Integrals

Vector Calculus

- Vector Fields
- Line Integrals
- Conservative Vector Fields
- Green's Theorem
- Divergence and Curl
- Surface Integrals
- Stokes' Theorem
- Divergence Theorem

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 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.

The 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>