Course Number and Title: MAT 283 Calculus III

Campus Location:
Dover, Stanton

Effective Date:
2018-51

Prerequisite:
MAT 282

Co-Requisites:
None

Course Credits and Hours:
4.00 credits
4.00 lecture hours/week
1.00 lab hours/week

Course Description:
This course provides a study of partial derivatives, multiple integrals, line integrals, and vectors.

Required Text(s):
Obtain current textbook information by viewing the campus bookstore - https://www.dtcc.edu/bookstores online or visit a campus bookstore. Check your course schedule for the course number and section.

Additional Materials:
Graphing calculator, Mathematica

Schedule Type:
Classroom Course
Hybrid Course
Online Course

Disclaimer:
None

Core Course Performance Objectives (CCPOs):

1. Analyze functions in three-dimensional space. (CCC 2, 6)
2. Perform operations on vectors and vector-valued functions, and use them to solve problems in two- and three-dimensional space. (CCC 2, 6)
3. Use partial derivatives, the gradient, and directional derivatives to solve application problems. (CCC 2, 6)
4. Evaluate multiple integrals, and apply them to solve problems involving areas and volumes over two- and three-dimensional regions. (CCC 2, 6)
5. Evaluate line integrals over vector fields and physical applications. (CCC 2, 6)

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

Measurable Performance Objectives (MPOs):
Upon completion of this course, the student will:

1. Analyze functions in three-dimensional space.
    1. Determine limits and continuity of multivariable functions.
    2. Sketch level curves and surfaces of multivariable functions.
    3. Determine the domain of a multivariable function.
    4. Determine the graph of an equation in three-dimensional space, including quadric surfaces.
    5. Determine equations of surfaces and curves in three-dimensional space.
2. Perform operations on vectors and vector-valued functions, and use them to solve problems in two- and three-dimensional space.
    1. Perform operations with vectors and vector-valued functions utilizing the concepts of scalars, unit vectors, dot product, cross product, orthogonal vectors, components, limits, differentiation, and integration.
    2. Use vectors to solve problems of curvilinear motion involving the concepts of velocity, acceleration, arc length, curvature, tangential, and normal components.
3. Use partial derivatives, the gradient, and directional derivatives to solve application problems.
    1. Determine partial derivatives of a multivariable function.
    2. Apply concepts of increments and the chain rule to derivatives of the composition of functions.
    3. Use the concept of directional derivatives and the gradient in determining equations of tangent planes and normal lines.
    4. Determine extrema using Lagrange multipliers and the discriminant.
4. Evaluate multiple integrals, and apply them to solve problems involving areas and volumes over two- and three-dimensional regions.
    1. Evaluate multiple integrals.
    2. Express the area of a region in terms of one or more iterated integrals using rectangular, polar, or parametric equations.
    3. Evaluate a double integral over a region that is rectangular or curved using rectangular or polar coordinates.
    4. Evaluate a triple integral over a solid using rectangular, cylindrical, or spherical coordinates.
    5. Find the area of a surface over a given region.
5. Evaluate line integrals over vector fields and physical applications.
    1. Sketch vector and vector-valued functions (including parametric surfaces) in their appropriate vector fields.
    2. Evaluate the curl or divergence and the physical significance of a vector-valued function.
    3. Evaluate a line and surface integral.
    4. Apply the concepts of independence of path, potential, and the curl of a vector-valued function.
    5. Demonstrate the appropriate application of Green's theorem, Stokes' theorem, and the divergence theorem.

Evaluation Criteria/Policies:
Students must demonstrate proficiency on all CCPOs at a minimal 75 percent level to successfully complete the course. The grade will be determined using the Delaware Tech grading system:

92	–	100	=	A
83	–	91	=	B
75	–	82	=	C
0	–	74	=	F

Students should refer to the Student Handbook - https://www.dtcc.edu/handbook for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

Core Curriculum Competencies (CCCs are the competencies every graduate will develop):

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):
None

Disabilities Support Statement:
The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the disabilities services - https://www.dtcc.edu/disabilitysupport web page or visit the campus Advising Center.