



Course Name: Calculus III

Course Number: MAT*E268

Credits: 4

Catalog description: A continuation of MAT*256. Topics include vectors and geometry of space, vector valued functions, functions of several variables, multiple integrals, and vector analysis.

Prerequisite: MAT*256 with a grade of C or higher

General Education Competencies Satisfied:

HCC General Education Requirement Designated Competency Attribute Code(s):
None

Discipline-Specific Attribute Code(s):

MATH Mathematics elective

Course objectives:

General Education Goals and Outcomes:

None

Course Specific Objectives:

1. Perform operations of differentiation, integration, and dot and cross products on vector functions.
2. Integrate functions of several variables.
3. Convert Cartesian coordinates to polar, cylindrical and spherical coordinates.
4. Sketch three-dimensional surfaces.
5. Apply both Green's and Stokes' theorems to vector field problems.

Course Content:

Vectors and Geometry of Space

Three-dimensional coordinate systems
Vectors
The dot product
The cross product
Equations of lines and planes
Functions and surfaces
Cylindrical and spherical coordinates

Vector Valued Functions

Vector functions and space curves
Derivatives and integrals of vector functions
Arc length and curvature

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Motion in space: velocity and acceleration

Functions of Several Variables

Limits and continuity
Partial derivatives
Tangent planes and linear approximations
The chain rule
Directional derivatives and the gradient vector
Maximum and minimum values

Multiple Integrals

Double integrals over rectangles
Iterated integrals
Double integrals over general regions
Double integrals in polar coordinates
Triple integrals
Triple integrals in spherical and cylindrical coordinates
Change of variables in multiple integrals.

Vector Analysis

Vector fields
Line integrals
The Fundamental Theorem for line integrals
Green's Theorem
Curl and divergence
Surface integrals
Stokes' Theorem
The Divergence Theorem

REV 1/2015

REV 02/27/2017