

## CUMBERLAND COUNTY COLLEGE

**Course: MA 210 Calculus III**

**Credits: 4**

**Prerequisites**

MA 140

**Description**

A rigorous continuation of MA140. Topics include a review of infinite series, conic sections, parametric equations, polar coordinate system and equations, vector valued functions, functions of several values, partial and directional derivatives, and multiple integration. Theory is augmented by applications from a variety of disciplines.

**Learning Outcomes**

At the completion of this course, students will be able to:

- Analyze the shape and directions of a vector valued function
- Describe the shape and contours of a multivariable function
- Determine arc length, curvature, and tangent vectors for vector valued functions
- Determine the surface area, optimal points, and tangent planes for multivariable functions
- Compute multiple integrals over a variety of regions in rectangular, polar, and spherical coordinate systems
- Compute line and surface integrals

**Topical Outline**

- Vectors and Geometry of Space
  - Three-Dimensional Coordinate Systems
  - Vectors
  - The Dot Product
  - The Cross Product
  - Lines and Planes in Space
  - Cylinders and Quadric Surfaces
- Vector-Valued Functions and Motion in Space
  - Curves in Space and Their Tangents
  - Integrals of Vector Functions; Projectile Motion
  - Arc Length in Space
  - Curvature and Normal Vectors of a Curve
  - Tangential and Normal Components of Acceleration
  - Velocity and Acceleration in Polar Coordinates
- Partial Derivatives
  - Functions of Several Variables
  - Limits and Continuity in Higher Dimensions
  - Partial Derivatives
  - The Chain Rule
  - Directional Derivatives and Gradient Vectors

- Tangent Planes and Differentials
- Extreme Values and Saddle Points
- Lagrange Multipliers
- Multiple Integrals
  - Double and Iterated Integrals over Rectangles
  - Double Integrals over General Regions
  - Area by Double Integration
  - Double Integrals in Polar Form
  - Triple Integrals in Rectangular Coordinates
  - Moments and Centers of Mass
  - Triple Integrals in Cylindrical and Spherical Coordinates
  - Substitution in Multiple Integrals
- Integrals and Vector Fields
  - Lines Integrals
  - Vector Fields and Line Integrals
  - Path Independence
  - Green's Theorem
  - Surfaces and Area
  - Surface Integrals
  - Stoke's Theorem

### **Required Texts and Other Materials**

Thomas' Calculus Early Transcendentals, 13th ed: Pearson.

### **Student Assessment:**

Assessment may be accomplished through projects, portfolios, online assignments, exams, presentations and/or papers.

### **Academic Integrity**

Plagiarism is cheating. Plagiarism is presenting in written work, in public speaking, and in oral reports the ideas or exact words of someone else without proper documentation. Whether the act of plagiarism is deliberate or accidental [ignorance of the proper rules for handling material is no excuse], plagiarism is, indeed, a “criminal” offense. As such, a plagiarized paper or report automatically receives a grade of **ZERO** and the student may receive a grade of **F** for the semester at the discretion of the instructor.

### **Available Resources**

If you are having difficulty with work in this class, tutoring is available through the Success Center. If you think that you might have a learning disability, contact Project Assist at 856.691.8600, x1282 for information on assistance that can be provided to eligible students.

**(List availability of open labs and/or writing center)**

### **Before Withdrawing From This Course**

If a student experiences adverse circumstances while enrolled in this course and considers withdrawing, s/he should see an advisor (division or advisement center) BEFORE withdrawing from the class. A withdrawal may cause harmful repercussions to completion rate standards and overall GPA which can limit or eliminate future financial aid in addition to causing academic suspension.