Department Master Syllabus
Camden County College
Blackwood, New Jersey

Course Title: Calculus III

Course Number: MTH-210

Department/Program Affiliation: Mathematics

Date of Review: **11/2021**

(This Department Master Syllabus has been examined by the program/department faculty members and it is decided that no revision is necessary at this time.)

Date of Last Revision: **11/2021**

(This Department Master Syllabus has been examined by the program/department faculty members and it is decided a change requiring a revision is necessary at this time.)

N.B. A change to the course materials alone (textbooks and/or supplementary materials) may not constitute a revision. Any other change to the items listed below on this form is considered a revision and requires approval by the program faculty at a Program/Department Meeting and by the division at a Chairs and Coordinator Meeting.

Credits: 4

Contact Hours: **Lecture**   **4**   **Lab**   **0**   **Other 0**

Prerequisites: MTH-150 (Calculus II)

Corequisites: None

Course Description: This course is a continuation of MTH-150 (Calculus II). Topics include: Calculus of polar and parametric equations, differential calculus of several variables, multiple integration, two and three-dimensional vectors, vector valued functions and vector analysis.

Course Student Learning Outcomes: (Cognitive, Psychomotor, Affective Domains)
Upon completion of this course, the student will be able to:

- identify and find attributes of conic sections, as assessed by tests, quizzes, homework, or projects.
- use parametric and polar equations of curves in order to determine some of their properties, as assessed by tests, quizzes, homework, or projects.
- apply vector algebra to problems involving lines, planes and surfaces in space, as assessed by tests, quizzes, homework, or projects.
- formulate and solve problems in cylindrical and spherical coordinates, as assessed by tests, quizzes, homework, or projects.
- solve problems involving vector-valued functions, as assessed by tests, quizzes, homework, or projects.
- investigate limits, derivatives, integrals, and applications of functions of several variables, as assessed by tests, quizzes, homework, or projects.

- determine properties of vector fields and understand the meaning, calculations and applications involving line integrals, as assessed by tests, quizzes, homework, or projects.

General Education Student Learning Outcomes:
Students will apply appropriate mathematical and statistical concepts and operations to interpret data and to solve problems, as assessed by tests, quizzes, homework, or projects.

Course Outline:
Unit I. Parametric and Polar Curves
> Parametric Equations
> Polar Coordinates
> Calculus in Polar Coordinates
> Conic Sections

Unit II. Vectors and the Geometry of Space
> Vectors in the Plane
> Space Coordinates and Vectors in Space
> Dot Product of Two Vectors
> Cross Product of Two Vectors in Space
> Lines and Planes in Space
> Surfaces in Space
> Cylindrical and Spherical Coordinates

Unit III. Vector-Valued Functions
> Vector Valued Functions
> Differentiation and Integration of Vector-valued Functions
> Velocity and Acceleration
> Tangent Vectors and Normal Vectors
> Arc Length and Curvature

Unit IV. Functions of Several Variables
> Introduction to Functions of Several Variables
> Limits and Continuity
> Partial Derivatives
> Differentials
> Chain Rules
> Directional Derivatives and Gradients
> Tangent Planes and Normal Lines
> Extrema of Functions of Two Variables
> Applications of Extrema of Functions of Two Variables
> Lagrange Multipliers

Unit V. Multiple Integration
> Iterated Integrals and Area in the Plane
> Double Integrals and Volume
> Change of Variables: Polar Coordinates
> Center of Mass and Moments of Inertia
> Surface Area
> Triple Integrals and Applications
> Triple Integrals in Cylindrical and Spherical Coordinates

Unit VI. Vector Analysis
            Vector Fields
            Line Integrals
            Conservative Vector Fields and Independence of Path
            Green's Theorem
            Stokes' Theorem

Course Activities:
The classroom activities will include formal and informal lectures where new material and assigned problems will be explained. Students will be encouraged to participate in discussion during the presentation and at times present problems on the blackboard. Time will be set aside to answer specific questions concerning homework problems and other previous material. Software and/or calculators (TI 83, 84, 89) exercises will be given and methods of analysis will be discussed.

Assessment of Student Learning Outcomes: The student will be evaluated on the degree to which student learning outcomes are achieved. . In addition to a minimum of two tests, a variety of methods may be used such as class participation, projects, homework assignments, etc. (There must be some evidence that the learning outcomes have been achieved.) Student progress will be evaluated on the following basis:
1.   Unit Tests
2.   Periodic Quizzes, if you deem they are necessary to motivate students to study and attend class on a regular basis.
3.   Electronic Homework assignments, if graded.
4.   Other graded homework or software projects.
5.   Class attendance, if you have specified this at the beginning of the semester.
6.   Comprehensive final examination (optional).

Grading:
    A   90 to 100
    B   80 to 89
    C   70 to 79
    D   60 to 69
    F   Below 60
    FA   Below 60 and failure to meet attendance expectations
    I   Incomplete (only under extreme emergencies) Must be completed within one semester.
    NA   Not attending
    XA   Never attended
    W   Withdraw (student must submit an official withdrawal form by the deadline)

Course Materials:

Textbook: *Calculus, Early Transcendental Functions*, Briggs, Cochran and Gillett, Pearson, current edition

Supplemental Materials: *Students Solutions Manual*
                                      TI-83/84 Plus Graphing Calculator – recommended
                                      Textbook specific course management system.