Alabama Community College System

MTH 227
Calculus III

I.   MTH 227 Calculus III– 4 Semester Hours

II.   Course Description

This is the third of three courses in the basic calculus sequence. Topics include vector functions, functions of two or more variables, partial derivatives (including applications), quadric surfaces, multiple integration, and vector calculus (including Green's Theorem, curl and divergence, surface integrals, and Stokes' Theorem).

III.   Prerequisite

Grade of C or higher in MTH 126

IV.   Textbook

Due to the varied selection of quality college-level textbooks, each college will select the textbook needed to meet the requirements of this course.

V.   Course Learning Outcomes

By the end of the course, students will be able to:
1.   determine partial derivatives and apply techniques to solve application problems,
2.   demonstrate the properties and applications of multiple integration,
3.   demonstrate concepts and applications of vector-valued functions and vector fields,
4.   develop parametric representations of curves and surfaces and use them to perform calculations,
5.   analyze and graph surfaces in three-dimensional space, and
6.   write and evaluate line and surface integrals.

VI.   Course Outline of Topics

Required Topics
1.   Quadric surfaces
2.   Cylindrical and spherical coordinates
3.   Calculus of vector-valued functions
        a.   Differentiation and integration
        b.   Velocity and acceleration
        c.   Tangent vectors and normal vectors
        d.   Arc length and curvature
4.   Functions of several variables
        a.   Limits and continuity
        b.   Partial derivatives
        c.   Differentials
        d.   Chain rules for functions of several variables
        e.   Directional derivatives and gradients
        f.   Tangent planes and normal lines
        g.   Extrema of functions of two variables
        h.   Applications of extrema of functions of two variables
5.   Multiple integration and applications
        a.   Iterated integrals
        b.   Double integrals and volume
        c.   Change of variables: polar coordinates
        d.   Surface area
        e.   Triple integrals and applications
        f.   Triple integrals in cylindrical and spherical coordinates
        g.   Change of variables: Jacobians
6.   Vector fields
7.   Conservative vector fields and independence of path
8.   Line integrals
9.   Green's Theorem
10.   Parametric surfaces
11.   Surface integrals
12.   Divergence Theorem
13.   Stokes' Theorem

Optional Topics
1.   LaGrange Multipliers
2.   Center of mass and moments of inertia

VII.   Evaluation and Assessment

Grades will be given based upon A = 90 – 100%, B = 80 – 89%, C = 70 – 79%, D = 60 – 69%, and F = below 60%.

VIII.   Attendance

Students are expected to attend all classes for which they are registered. Students who are unable to attend class regularly, regardless of the reason or circumstance, should withdraw from that class before poor attendance interferes with the student's ability to achieve the objectives required in the course. Withdrawal from class can affect eligibility for federal financial aid.

IX.   Statement on Discrimination/Harassment

It is the official policy of the Alabama Community College System and entities under its control, including all Colleges, that no person shall be discriminated against on the basis of any impermissible criterion or characteristic, including, without limitation, race, color, national origin, religion, marital status, disability, sex, age, or any other protected class as defined by federal and state law. (ACCS Policies 601.02 and 800.00)

X.   Americans with Disabilities

The Rehabilitation Act of 1973 (Section 504) and the *Americans with Disabilities Act* of 1990 state that qualified students with disabilities who meet the essential functions and academic requirements are entitled to reasonable accommodations. It is the student's responsibility to provide appropriate disability documentation to the College.