Course Syllabus

Department: Mathematics

Date: January 26, 2012

I. Course Prefix and Number: MAT 273

Course Name: Calculus III

Credit Hours and Contact Hours: 4 Credit Hours, 4 Contact Hours

Catalog Description including pre- and co-requisites:

The calculus of multivariable functions and vectors. Topics include partial differentiation, multiple integrals, optimization, multiple integration, line integrals and vector fields.

Prerequisite: MAT 272.

II. Course Outcomes and Objectives

Student Learning Outcomes:

Upon completion of the course the student will be able to:

1) Use multivariable functions and analyze them algebraically and graphically.
2) Perform operations with vectors.
3) Find the partial derivatives of multivariable functions.
4) Find local and global extrema of multivariable functions.
5) Solve applied problems using multivariable functions and vectors.
6) Integrate multivariable functions.
7) Evaluate line integrals.
8) Apply Green's, divergence and Stokes' theorems.
9) Evaluate their results for reasonableness.

Relationship to Academic Programs and Curriculum:

This course is a service course that fulfills mathematics/science course requirements for many A.A. and A.S. degrees. A student should verify the appropriateness of this course for his program with his advisor.

College Learning Outcomes Addressed by the Course:

☐ writing	☐ computer literacy
☐ oral communications	☐ ethics/values
☒ reading	☐ citizenship
☒ mathematics	☐ global concerns
☒ critical thinking	☐ information resources

III. Instructional Materials and Methods

Types of Course Materials:

Textbook: Selected by department.
Calculator: TI-83 or TI-84

Methods of Instruction (e.g. Lecture, Lab, Seminar …):

1. Lectures
2. Discussions
3. Demonstrations
4. Group activities

IV. Assessment Measures (Summarize how the college and student learning outcomes will be assessed):

Student Learning Outcomes will be assessed through a variety of activities. The Mathematics department believes that each instructor should determine the grading system and evaluation methods that will be used in their sections of the course. Any grading system used in the course must be consistent with the College Catalog. These methods must be communicated to students the first week of the semester in writing. Possible evaluation methods include quizzes, tests, portfolios, collected assignments, group activities, et. al. Such evaluations and related assignments will develop a student's ability to read problems carefully, perform mathematics and use critical thinking techniques. Course policies with respect to attendance, late work, plagiarism, etc. must be communicated to the student.

V. General Outline of Topics Covered:

1) Functions of Several Variables
   a) Functions of Two Variables
   b) Three-Dimensional Space
   c) Graphs of Functions of Two Variables
   d) Contour Diagrams
   e) Linear Functions
   f) Functions of more than Two Variables
   g) Limits and Continuity

2) Vectors
   a) Displacement Vectors
   b) Vectors in General
   c) The Dot Product
   d) The Cross Product

3) Differentiating Functions of Many Variables
   a) Partial Derivative
   b) Computing Partial Derivatives Algebraically
   c) Local Linearity and the Differential
   d) Gradients and Directional Derivatives in the Plane
   e) Gradients and Directional Derivatives in Space.

4) Optimization: Local and Global Extrema

a) Local Extrema
b) Global Extrema: Unconstrained Optimization

5) Integrating Functions of Many Variables
   a) The Definite Integral of a Function of Two Variables
   b) Iterated Integrals
   c) Triple Integrals
   d) Double Integrals in Polar Coordinates
   e) Integrals in Cylindrical and Spherical Coordinates

6) Line Integrals
   a) The Idea of a Line Integral
   b) Computing Line Integrals Over Parameterized Curves
   c) Gradient Fields and Path-Independent Fields
   d) Green's Theorem

7) Calculus of Vector Fields
   a) The Divergence of a Vector Field
   b) The Divergence Theorem
   c) The Curl of a Vector Field
   d) Stokes' Theorem