Course Title: Calculus and Analytic Geometry III
Course No. MAT 223 No. of Credits 4 or 5
Associate Degree Designation MS

Course Prerequisites: A grade of C or better in MAT 222, or equivalent.

Catalog Description: Continuation of MAT 222. Analytic geometry of three dimensions, functions of several variables, partial differentiation, multiple integration, and introduction to differential equations.

Course Content (list of topics normally covered)

Three-dimensional analytic geometry
The three-dimensional rectangular coordinate system. Equations of lines and planes and related topics. Graphs of quadric surfaces. The cylindrical and spherical coordinate systems.

Vectors and vector functions.
Geometric and algebraic properties of vectors and vector operations. Algebra and calculus of vector functions. Arc length along a curve. The vector analysis of curvilinear motion.

Continuity and differentiation for real functions of several variables.

Multiple integration.
Multiple integrals for area, volume, surface area, and mass. Moments and centers of mass for thin plates and solids.

Vector fields and line integrals.

Differential equations.
Differential equations of the following types: separable, exact, first order linear, and second order linear with constant coefficients.

Optional topics.
Surface integrals, Stokes’ Theorem, and the Divergence Theorem.
Content-Based Departmental Proficiencies.
The successful student will be able to:

- Apply vector methods to solve problems involving lines and planes.
- Apply vector analysis in the study of space curves and be able to solve practical problems via vector functions.
- Compute partial derivatives and use partial derivatives to solve practical problems involving multi-variable functions.
- Set up and evaluate multiple integrals for volume, surface area, mass, and moments, using appropriate coordinate systems.
- Evaluate line and integrals, using Greene’s Theorem when appropriate.
- Solve differential equations of various types.
- Apply differential equations to solve practical problems.

Colleges-wide proficiencies assigned to course:

Students should be able to demonstrate the following:

A. Analytical skills Performance Indicators: Students should be able to:
   1. Interpret and synthesize information and ideas.
   4. Select and apply scientific and other appropriate methodologies.

B. Quantitative skills Performance Indicators: Students should be able to:
   1. Solve quantitative and mathematical problems.
   2. Interpret graphs, tables, and diagrams.

Representative Textbooks Used For The Course. (editions change over time)

Calculus, Larson, Hostetler and Edwards
Calculus, 6th Edition, Anton
Multivariable Calculus, 2nd Edition, Bradley and Smith

Approved April 22, 2006