Department: MATHEMATICAL SCIENCES   Semester Hours: 4

Course Title and Number: MATH 232 - Calculus III

Course Description: Continuation of MATH 230 Calculus II. Includes curves and surfaces, coordinate systems, vectors and vector-valued functions for the plane and space, functions of several variables, limits, continuity and partial derivatives of functions of several variables, integral calculus for functions of several variables.

PRQ: MATH 230 with a grade of C or better.

Course Objectives:

- To understand and connect concepts of the calculus with real world problems and other scientific disciplines.

- To value mathematics and develop an ability to communicate mathematics, both in writing and orally.

- To develop mathematical reasoning, and an ability to solve problems.

- To attain computational facility in multi-variable calculus.

   (More detailed objectives in the Assessment Appendix.)

Content:

- Curves and surfaces: Parametrizations of curves, including applications of single variable calculus to parametrized curves; lines and planes in space; surfaces.

- Coordinate systems: Polar coordinates for the plane; cylindrical and spherical coordinates in three dimensional space.

- Vectors: Vectors in the plane and in space; dot product; cross product; vector valued functions; arc length and the unit tangent vector.

- Functions of several variables: Limits and continuity.

- Differential calculus of functions of several variables: Derivatives; the chain rule; directional derivatives; maxima, minima, and saddle points; Lagrange multipliers.

- Integral calculus of functions of several variables: Double integrals and applications to areas, moments and center of mass; double integrals in polar form; triple integrals and applications to masses and moments; triple integrals in cylindrical and spherical coordinates; substitutions in multiple integrals.

- Other topics: Line integrals; vector fields; work; Green's Theorem.

Course Requirements: Written explanation of problem solutions and writing involving concepts. Discussion and presentation involving concepts and problem solutions in class settings. Competency in the computational aspects of the course. Solutions of problems representing applications of the calculus to other disciplines.

Assessment Instruments: Judgment on student involvement and depth of contributions in class discussion. Homework problem and writing assignments. Short quizzes. Hour examinations. Final examination.

Current Textbook: Stewart, **Calculus** 8th Edition, Cengage Learning, 2016.