NORTHWESTERN CONNECTICUT COMMUNITY COLLEGE

COURSE SYLLABUS

Course Title: Calculus III **Course #: MAT 268**

The course will revisit topics from a single variable calculus in the realm of three-dimensions. Topics include vector and the calculus of vector-valued functions, partial derivatives, multiple integration in rectangular, polar, cylindrical and spherical coordinates, and vector calculus. Knowledge of this subject-matter is essential for those pursuing studies in the physical sciences, engineering, mathematics or a host of other fields. Students are assumed to have a good grasp of differentiation and integration. The use of a graphing calculator is required in the course (TI-83 plus or TI-84 plus). 4 credits

Prerequisite: C or better in Calculus II (Mat 256).

Goals: It is the goal of the course to:

1. Cause the student to be an active learner.
2. Aid the student to develop increased confidence in their ability to conceptualize and perform mathematics.
3. Enhance the student's understanding of fundamental principles underlying calculus.
4. Prepare the students to apply calculus to other disciplines.
5. Inspire students to continue the study of mathematics.
6. Provide an experience wherein students enjoy learning and applying mathematics.

Outcomes: At the end of this course, a student should be able to:

Parametric and Polar Functions*

1. Graph and analyze parametric equations.
2. Find the derivative of parametric equations.
3. Convert between Cartesian and polar coordinates.
4. Graph simple polar functions.
5. Differentiate polar functions.
6. Apply integration to find the area bounded between polar graphs.

Vectors and Vector-Valued Functions

1. Plot vectors in two and three dimensions.
2. Find the length and direction of a vector.
3. Find sums and differences of vectors.
4. Calculate the dot product.
5. Define a vector-valued function.
6. Find limits of, differentiate, and integrate vector-valued functions.
7. Calculate the cross product of two vectors.
8. Graph lines, planes, surfaces, curves, and vector-valued functions in space.
9. Solve applied problems.

*Will be covered if not covered in MAT 256: Calculus II

Functions of Several Variables

1. Define functions of two and three variables.
2. Find the domain of a function of several variables.
3. Sketch the graph of a function of two variables.
4. Find the limit of a function of two variables.
5. Discuss the continuity of functions of two and three variables.
6. Take partial derivatives of functions of several variables.
7. Find differentials of functions of several variables.
8. Use the chain rule and implicit partial differentiation.
9. Find directional derivatives and gradients.
10. Find equations for tangent planes and normal lines to surfaces.
11. Find extrema of functions of two variables.
12. Solve optimization problems.

Multiple Integration

1. Integrate with respect to a given variable.
2. Find areas by iterated integrals.
3. Evaluate double integrals.
4. Find volumes by double integrals.
5. Find areas of polar regions.
6. Calculate mass, center of mass, and moments of inertia.
7. Use multiple integration to calculate surface area.
8. Evaluate triple iterated integrals and apply results to finding volumes, centers of mass, and moments of inertia.

Vector Calculus

1. Define and sketch vector fields.
2. Find the curl and divergence of a vector field.
3. Evaluate line integrals and use the fundamental theorem of line integrals.
4. Use Green's Theorem to evaluate line integrals.
5. Define and sketch parametric surfaces.
6. Find the area of a parametric surface.
7. Evaluate surface integrals.
8. Use the Divergence Theorem to evaluate integrals.
9. Use Stokes's Theorem to evaluate integrals.