MATH 2910 CALCULUS III

4 Credits
Offered in Lecture Format
Prerequisite required (MATH 1920 with a grade of C or better)

SYLLABUS

I. **VECTORS AND SOLID ANALYTIC GEOMETRY**

- A. Rectangular coordinates in space
- B. Vectors
  1. Notation
  2. Basic operations
  3. The dot product
  4. The cross product
- C. Lines in space
- D. Planes
- E. Quadric surfaces
- F. Cylinders

II. **VECTOR-VALUED FUNCTIONS**

- A. Limits and continuity
- B. Derivatives
- C. Unit tangent and unit normal
- D. Arc length
- E. Trajectories
- *F. Curvature
- G. Integration of vector functions

III. **FUNCTIONS OF SEVERAL VARIABLES**

- A. Graphs and domains
- B. Limits and continuity
- C. Partial derivatives
  1. Notation
  2. Terminology
  3. Higher order derivatives
- D. Differentiability
  1. Definition
  2. Related theorems
  3. The total differential
- E. Chain rules involving partial derivatives
- F. The gradient and directional derivatives
- G. Tangent planes and normal lines
- H. Optimization problems
  1. Extrema for functions of two variables
  2. Constrained problems; Lagrange multipliers

IV. MULTIPLE INTEGRALS

A. Double integrals
   1. Definition and properties
   2. Terminology
   3. Notation
   4. Evaluation using iterated integrals
   5. Conversion to polar coordinates
   6. The total mass of a plate
   *7. Center of mass
   *8. Moment of inertia
   *9. Surface area

B. Triple integrals
   1. Definition and properties
   2. Terminology
   3. Notation
   4. Evaluation using iterated integrals
   5. Conversion to cylindrical coordinates
   6. Conversion to spherical coordinates
   *7. Applications

C. Jacobians
   1. Two variable case
   2. Three variable case

V. BASIC VECTOR CALCULUS

A. Vector fields

B. Line integrals
   1. Definitions and properties
   2. Evaluation using definite integrals
   3. Independence of path in the plane
   4. Work
   5. Green's theorem in the plane

C. Surface integrals
   1. Definition and properties
   2. Evaluation using double integrals
   3. The divergence theorem
   4. Stokes' theorem

*Optional