**STUDENT SYLLABUS**

**FOR**

**MATH 3335, VECTOR ANALYSIS**

**PREREQUISITES:** MATH 2433 or the approval of the chair

**RECOMMENDED TEXT:** *"Introduction to Vector Analysis"*, 7th Ed., by H. F. Davis and A. D. Snider, Wm. C. Brown, Publ., 1998.

Another good text is *"Vector Calculus"* by P. C. Matthews, Springer-Verlag, 1998 (It may be useful for the instructor to look at the text *"Div, Grad, Curl and All That*" by H. M. Shey, W. W. Norton & Co., 1973, to see a physicist's view of the material)

This course is an introduction to the theory of vector fields in 2 and 3 dimensions and some associated differential geometry. It is primarily a service course for students majoring in physics and engineering. The hope is that the course will cover the mathematical background required for classical continuum theories and electromagnetic field theory.

The prerequisite for the course is Math 2433 and the course may be regarded as a natural continuation of Math 2433. The emphasis is not on complete proofs, but rather on intuition and/or plausibility.

**SUGGESTED SYLLABUS**

This syllabus is based on the recommended text by Davis and Snider.

1. Introduction to vectors in the plane and in space; scalar and vector products, parametric equations of lines and planes, length, area and volume of boxes and tetrahedra.

2. Vector-valued functions of a scalar variable and the analysis of curves in space. Tangents, normals and curvature.

3. Vector fields in Cartesian coordinates, their field lines, gradients and vector differential operators, (div, grad, curl and Dv = matrix derivative of the field v). The scalar and vector Laplacian.

4. Spherical and cylindrical polar coordinate systems, unit vector fields (moving frames) and vector differential operators in these systems.

5. Line, surface and volume integrals, characterization of irrotational fields.

6. The Divergence Theorem and Stokes' Theorem in 3 dimensions and associated theorems.