MATH 406 Linear Algebra III

1. Catalog Description

MATH 406 Linear Algebra III **4 units**

Prerequisite: MATH 306.

Rigorous development of real and complex inner product spaces. Orthogonal bases and direct sums of subspaces. Linear transformations on inner product spaces. Properties of self-adjoint and normal operators. Additional topics such as the Jordan Decomposition Theorem and the Spectral Theorem. 4 lectures.

2. Required Background or Experience

Math 306.

3. Learning Objectives

The student should learn the language and methods of linear algebra and some of the most important applications.

4. Text and References

To be chosen by the instructor. Suggested texts include:

- Strang, Gilbert, Introduction to Applied Mathematics.
- Trefethen, Lloyd N. and David Bau, Numerical Linear Algebra
- Watkins, David S., Fundamentals of Matrix Computations

5. Minimum Student Materials

Paper, pencils, and notebook.

6. Minimum University Facilities

Classroom with ample chalkboard space for class use.

7. Content and Method

a. Inner product spaces
b. Spectral Theorem for symmetric and self-adjoint matrices
c. Cayley-Hamilton Theorem and the minimal polynomial
d. Jordan and rational canonical forms
e. Fourier series and other applications

Additional topics selected by instructor. Possible topics include more on canonical forms, numerical linear algebra, introductory functional analysis, operations research, linear programming, linear codes.

8. Methods of Assessment

The primary methods of assessment are: essay examinations, quizzes and homework. Typically, there will be one or more hour-long examinations during the quarter, and a required comprehensive final examination. Students are required to show their work and are graded not only on the correctness of their answers, but also on their understanding of the concepts and techniques.