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

Comprehensive final exam, mid-term exams or quizzes, homework.