COURSE INFORMATION

Course Description: Similar in aim and content to MATH 630 but with more emphasis on mathematical rigor. Linear systems of equations, matrix algebra, linear spaces, orthogonality, eigenvalues and eigenvectors, diagonalization, and matrix decomposition. Applications.

Number of Credits: 3

Prerequisites: MATH 222 and MATH 337, or departmental approval.

Course-Section and Instructors

Course-Section	Instructor
Math 631-001	Professor T. Askham

Required Textbooks:

Title	*Linear Algebra and Its Applications*
Author	Peter Lax
Edition	2nd Ed.
Publisher	Wiley
ISBN #	9780471751564

University-wide Withdrawal Date:The last day to withdraw with a **W** is **Monday, November 11, 2017**. It will be strictly enforced.

REFERENCE TEXT

- Numerical Linear Algebra by Trefethen and Bau, SIAM, 1st Edition

The text is on reserve at the library.

COURSE GOALS

Course Objectives

- To develop a deeper understanding of linear maps in a finite dimensional setting.
- To gain intuition for core concepts, including: eigenvalues and eigenvectors, singular value decompositions, duality, rank, and determinants.
- To master the basics of linear algebra practice, including: numerically solving a system of equations and computing with matrix decompositions.

Course Outcomes

- Students recognize when linear algebra concepts can be applied to a variety of mathematical and engineering problems.

- Students demonstrate the ability to apply numerical methods to solve linear algebra problems with accuracy, precision, and efficiency.
- Students demonstrate greater ability in making and understanding rigorous arguments.

Course Assessment: Assessment will be performed with homework assignments, a midterm exam, and a final exam that will test understanding of the above concepts. Assignments will be posted on the course website.

Grading Policy: The final grade in this course will be determined as follows:

Homework	40%
Midterm Exam	30%
Final Exam	30%

Your final letter grade will be based on the following tentative curve.

A	90 - 100	**C+**	76 - 79
B+	86 - 89	**C**	60 - 75
B	80 - 85	**F**	< 60

Exams: There will be one midterm exam held in class during the semester and one comprehensive final exam. Exams are held on the following days:

Midterm Exam	October 28, 2019
Final Exam Period	December 14-20, 2019

The final exam will test your knowledge of all the course material taught in the entire course.

Course Outline

Lecture	Chapter	Topic
1 - 3	1 - 2	Fundamentals and Duality
4 - 8	3 - 5	Linear maps, matrices, determinants, and trace
9 - 11	6	Spectral theory part I (general maps)
12 - 14	7	Euclidean structure
15	**REVIEW**	
16	**MIDTERM EXAM – 10/28**	
17 - 19	8	Spectral theory part II (self-adjoint maps)
20 - 22	10	Matrix inequalities and other topics
23 - 27	Notes	Matrix decompositions, applications, and algorithms
28	**REVIEW FOR FINAL EXAM**	

Updated by Professor T. Askham - 7/17/2019

Department of Mathematical Sciences Course Syllabus, *Fall 2019*