Fall 2019

MATH 631-001: Linear Algebra

T. Askham

NJIT New Jersey's Science & Technology University

THE COLLEGE OF SCIENCE AND LIBERAL ARTS

THE DEPARTMENT OF MATHEMATICAL SCIENCES

MATH 631 : Linear Algebra
Fall 2019 Graduate Course Syllabus

NJIT Academic Integrity Code: All Students should be aware that the Department of Mathematical Sciences takes the University Code on Academic Integrity at NJIT very seriously and enforces it strictly. This means that there must not be any forms of plagiarism, i.e., copying of homework, class projects, or lab assignments, or any form of cheating in quizzes and exams. Under the University Code on Academic Integrity, students are obligated to report any such activities to the Instructor.

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

Office Hours for All Math Instructors: Fall 2019 Office Hours and Emails

Required Textbooks:

Title	*Linear Algebra and its Applications*
Author	Peter Lax
Edition	2nd ed.
Publisher	Wiley
ISBN #	978-0471751564

University-wide Withdrawal Date:The last day to withdraw with a **W** is **Monday, November 11, 2019**. It will be strictly enforced.

REFERENCE TEXTS

- *Numerical Linear Algebra* by Trefethen and Bau, SIAM, 1st ed.

This 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 recognizze 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 the understanding of the above concepts. Assignments will be posted on the course website.

POLICIES

DMS Course Policies: All DMS students must familiarize themselves with, and adhere to, the Department of Mathematical Sciences Course Policies, in addition to official university-wide policies. DMS takes these policies very seriously and enforces them strictly.

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

Attendance Policy: Attendance at all classes will be recorded and is **mandatory**. Please make sure you read and fully understand the Math Department's Attendance Policy. This policy will be strictly enforced.

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. Make sure you read and fully understand the Math Department's Examination Policy. This policy will be strictly enforced.

Makeup Exam Policy: To properly report your absence from a midterm or final exam, please review and follow the required steps under the DMS Examination Policy found here:

- http://math.njit.edu/students/policies_exam.php

Cellular Phones: All cellular phones and other electronic devices must be switched off during all class times.

ADDITIONAL RESOURCES

Accommodation of Disabilities: Disability Support Services (DSS) offers long term and temporary accommodations for undergraduate, graduate and visiting students at NJIT.

If you are in need of accommodations due to a disability please contact Chantonette Lyles, Associate Director of Disability Support Services at 973-596-5417 or via email at lyles@njit.edu. The office is located in Fenster Hall, Room 260. A Letter of Accommodation Eligibility from the Disability Support Services office authorizing your accommodations will be required.

For further information regarding self identification, the submission of medical documentation and additional support services provided please visit the Disability Support Services (DSS) website at:

- https://www.njit.edu/studentsuccess/accessibility/

Important Dates (See: Fall 2019 Academic Calendar, Registrar)

Date	Day	Event
September 3, 2019	T	First Day of Classes
September 13, 2019	F	Last Day to Add/Drop Classes
November 11, 2019	M	Last Day to Withdraw
November 26, 2019	T	Thursday Classes Meet
November 27, 2019	W	Friday Classes Meet
November 28-29, 2019	R-F	Thanksgiving Recess
December 11, 2019	W	Last Day of Classes
December 12, 13 2019	R & F	Reading Days
December 14-20, 2019	F - R	Final Exam Period

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