

MATH 631: Linear Algebra *Fall 2022 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.

It is my professional obligation to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating or plagiarizing will be subject to disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu

COURSE INFORMATION

Course Description: A graduate-level treatment of linear algebra with emphasis on mathematical rigor and depth of understanding. Topics include linear spaces, duality, matrices, determinants, spectral theory, inner product spaces, and matrix decomposition. Time permitting, numerical aspects of eigenvalue calculations are covered.

Number of Credits: 3

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

Course-Section and Instructors:

Course-Section	Instructor
Math 631-001	Professor C. Frederick

Office Hours for All Math Instructors: [Fall 2022 Office Hours and Emails](#)

Required Textbook:

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

- Optional: Numerical Linear Algebra by L. N. Trefethen and D. Bau (1st Ed) SIAM
- Optional: Linear algebra Hoffman, Kenneth, and Ray Kunze (2nd Ed), Prentice-Hall

University-wide Withdrawal Date: The last day to withdraw with a M is **Monday, November 14, 2022**. It will be strictly enforced.

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: solving a system of equations and applying 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.

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/Quizzes	25%
Midterm Exam	35%
Final Exam	40%

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	0 - 59

Attendance Policy: Attendance at all classes is **mandatory**. Please make sure you read and fully understand the **Math Department's Attendance Policy**.

Email and Canvas: Regularly check your NJIT email account and the course information posted on Canvas for class assignments and announcements from your instructor.

Homework: Homework problem sets will be assigned regularly via Canvas and may include problems requiring basic coding in MATLAB or Python. Selected problems will be graded.

- This homework must be typeset in LaTeX using the provided template and submitted through Canvas.
- **I take issues of academic dishonesty very seriously:**
 - The logic of a proof must be completely clear and you must cite sources to receive full credit e.g., [Lax, Ch. 13, Theorem 5].
 - Collaboration with other students is encouraged, but you are not allowed to consult the written work of others. If you have collaborated with other students, indicate their names on the first page.
 - No consultation with internet sources outside of the textbook and approved online resources is allowed.

Exams: As of now, all exams will be administered in person. Midterm exams will be held during a regular class meeting; the location and date of the final will be provided to you when they are set.

Midterm Exam	October 24, 2022
Final Exam Period	December 16 - 22, 2022

The final exam will cover all of the 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: There will be **NO MAKE-UP QUIZZES OR EXAMS** during the semester. In the event an exam is not taken under rare circumstances where the student has a legitimate reason for missing the exam, the student should contact the Dean of Students office and present written verifiable proof of the reason for missing the exam, e.g., a doctor's note, police report, court notice, etc. clearly stating the date AND time of the mitigating problem. The student must also notify the Math Department Office/Instructor that the exam will be missed.

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

ADDITIONAL RESOURCES

Further Assistance: For further questions, students should contact their instructor. All instructors have regular office hours during the week. These office hours are listed on the Math Department's webpage for [Instructor Office Hours and Emails](#).

Accommodation of Disabilities: The Office of Accessibility Resources and Services (OARS) 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 Scott Janz, Associate Director of Disability Support Services at [973-596-5417](tel:973-596-5417) or via email at scott.p.janz@njit.edu. The office is located in Kupfrian Hall, Room 201. A Letter of Accommodation Eligibility from the Office of Accessibility Resources and 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 [Office of Accessibility Resources and Services \(OARS\)](#)

website.

Important Dates (See: [Fall 2022 Academic Calendar](#), Registrar)

Date	Day	Event
September 5, 2022	Monday	Labor Day
September 6, 2022	Tuesday	First Day of Classes
September 12, 2022	Monday	Last Day to Add/Drop Classes
November 14, 2022	Monday	Last Day to Withdraw
November 22, 2022	Tuesday	Thursday Classes Meet
November 23, 2022	Wednesday	Friday Classes Meet
November 24 to November 25, 2022	Thursday and Friday	Thanksgiving Recess - Closed
November 26, 2022	Saturday	Saturday Classes Meet
December 14, 2022	Wednesday	Last Day of Classes
December 15, 2022	Thursday	Reading Day
December 16 to December 22, 2022	Friday to Thursday	Final Exam Period

Course Outline

Chapter	Topic
1 - 2	Fundamentals and Duality
3 - 5	Linear Maps, Matrices, Determinants, and Trace
6	Spectral Theory Part I (General Maps)
7	Euclidean Structure
	Midterm Exam - 10/24
8	Analytic spectral theory
10	Matrix Inequalities and other topics
notes	Matrices in practice
	The final exam period is December 16 - 22, 2022

*Updated by Professor C. Frederick - 8/12/2022
Department of Mathematical Sciences Course Syllabus, Fall 2022*