MATH 337: 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.

COURSE INFORMATION

Course Description: Matrices, determinants, systems of linear equations, vector spaces, linear transformations, eigenvalues, eigenvectors, and related topics.

Number of Credits: 3

Prerequisites: MATH 112 with a grade of C or better or MATH 133 with a grade of C or better.

Course-Section and Instructors:

Course-Section	Instructor
Math 337-001	Professor J. Luke
Math 337-005	Professor Y.-N. Young
Math 337-009	Professor J. MacLaurin
Math 337-101	Professor E. Ammicht

Office Hours for All Math Instructors: Fall 2022 Office Hours and Emails

Required Textbook:

Title	*A First Course in Linear Algebra*
Author	K. Kuttler and I. Farah
Edition	Version 2021 A
Publisher	Lyryx Learning Inc
Link	Available in Canvas

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:

The course seeks to develop

- understanding of the fundamental concepts of linear structure that support theoretical, applied and computational analysis including R^n and C^n, linear combination, span, linear independence, basis and dimension, Euclidean structure, matrices and linear transformations, invertibility, rank, null space, column space, and determinant,
- understanding of the fundamental algorithms of elementary linear algebra, Gaussian elimination and the Gram-Schmidt process, including proficiency in implementation both with pen and paper and by computer program,
- the ability to use linear theory to analyze problems common in applications including systems of linear equations, detection linear dependence relations, LU factorization, eigenvalue problems, orthogonalization, QR factorization, least squares solutions, and the singular value decomposition,
- basic proficiency, both with pen and paper and by computer program, with the use of the fundamental algorithms of elementary linear algebra for the solution of common problems including those listed above,
- the capacity to apply linear algebra through treatment of applications such as balancing chemical equations and computer graphics.

Course Outcomes:

Students will be able to

- understand and utilize the basic concepts, algorithms and problems of linear algebra to analyze basic applied problems,
- Implement basic solutions to problems of applied linear algebra both by hand and computer program (MATLAB),
- apply their understanding of linear algebra in appropriately formulated applications.

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:

Quizzes	15%
MATLAB Assignments	15%
Midterm Exams	20% (x2)
Final Cumulative Exam	30%

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

A	90 - 100	C	70 - 74
B+	85 - 89	D	60 - 69
B	80 - 84	F	0 - 59
C+	75 - 79		

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.

Quizzes: Online quizzes, given on a roughly weekly basis, will focus on a collection of fourteen fundamental computations that are foundational for the course. The intention of the quizzes is to provide students an opportunity to begin mastery of these crucial computations on which much of the course depends.

MATLAB Projects: Weekly MATLAB projects will cover the implementation and use of basic algorithms in linear algebra. The coding of the algorithms is not only a tool of application but also a pathway for understanding. Common exams will feature problems requiring proficiency with MATLAB implementation of basic algorithms.

Homework: Homework assignments are provided to assist students to develop their understanding and skills with linear algebra.   These assignments are neither collected or graded.   Students should develop and use judgment as to which exercises are needed for them to develop adequate understanding of the material. The standing advice, particularly at the beginning of the course, is that it is better to do too much than too little. Students are urged to seek assistance with problems and exercises with which they have struggled unsuccessfully.

Exams: There will be three exams during the semester and a cumulative final exam during the final exam week:

Midterm Exam I	October 12, 2022
Midterm Exam II	November 30, 2022
Final Exam Period	December 16 - 22, 2022

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: 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

Math Tutoring Center: Located in the Central King Building, Lower Level, Rm. G11 (See: Fall 2022 Hours)

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 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

The course is divided into three stages each punctuated by a common exam.

Stage	Content (lecture count)	Text Chapters	Topics	Exam
I	Introduction (9)	1 - 2	Systems of linear equations Matrices	10/12
II	Core Theory: Linear and Euclidean Structure (11)	3 - 6	Determinants Linear combinations Spanning, independence, basis Inner product, orthogonality, Gram Schmidt Linear transformations Fundamental subspaces Complex numbers	11/30
III	Topics for Application (5)	7	Diagonalization (eigenvalue problems) Singular Value Decomposition Positive definite matrices QR factorization	TBD 12/16-12/22