NJIT
New Jersey's Science & Technology University

THE COLLEGE OF SCIENCE AND LIBERAL ARTS

THE DEPARTMENT OF MATHEMATICAL SCIENCES

MATH 337: Linear Algebra
Summer 2021 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.

DMS Online Exam Policy Summer 2021: Exams will be proctored using both Respondus LockDown Browser+Monitor and Webex. Students will be required to join a Webex meeting from their phone with their cameras on, and to access the exam through LockDown Browser on a Mac or Windows PC with webcam. Students must follow all instructions related to environment checks and camera positioning.

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 337-040	Professor J. Ro
Math 337-140	Professor J. Ro

Office Hours for All Math Instructors: Summer 2021 Office Hours and Emails

Required Textbook:

Title	*Linear Algebra and its Applications*
Author	Lay
Edition	5th
Publisher	Pearson
ISBN #	978-0321982384

Withdrawal Date: Please see the Summer 2021 Academic Calendar for the last day to withdraw based on the summer session you are registered for.

TECHNOLOGY REQUIREMENTS

This is online course, and you will meet the WebEx Room every class.

You must have a webcam and microphone in order to take the classes, as well as exams.

WebEx Meeting: https://njit.webex.com/meet/jronjit.edu

COURSE GOALS

Course Objectives

- Learn about matrices, determinants, applications to solving linear system of equations, matrix factorization, eigenvalues and eigenvectors, Gram-Schmidt process.
- Cover relevant applications in economics, science and engineering to illustrate the utility of learning these topics.
- Use mathematical software, in problem solving, to allow the solution of more complex problems and provide visualization of the same.

Course Outcomes

- Prepare students for further study in theoretical courses such as differential and difference equations and least squares analyses.
- To enable students to use linear algebra use for numerical solvability of many problems.
- Students are prepared for applying linear algebra to many practical applications in fields like economics, computer science, physics, engineering, archeology, demography, relativity, etc.

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	30%
Midterm Exam	30%
Final Exam	40%

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

A	90 - 100	C	60 - 69
B+	85 - 89	D	50 - 59
B	75 - 84	F	0 - 49
C+	70 - 74		

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. Absences from class will inhibit your ability to fully participate in class discussions and problem solving sessions. Tardiness to class is very disruptive to the instructor and students and will not be tolerated. Students might be withdrawn from the class or receive an "F" because of absences.

Quiz Policy: A short quiz based on homework and lecture will be given weekly.

Exams: There will be one midterm exam held during the semester and one comprehensive common final exam.

Tentative exam dates are::

Common Midterm Exam I	June 21, 2021
Final Exam	July 19, 2021

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

Math Tutoring Center: Located in the Central King Building, Room G11 (See: Summer 2021 Hours)

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 Chantonette Lyles, Associate Director of the Office of Accessibility Resources and Services at 973-596-5417 or via email at lyles@njit.edu. The office is located in Kupfrian Hall, Room 201. A Letter of Accommodation Eligibility from the Office of Accessibilty Resources and Services 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 at: https://www.njit.edu/studentsuccess/accessibility/

Important Dates (See: Summer 2021 Academic Calendar, Registrar)

Date	Event
May 24, 2021	First Day of Classes for **FIRST, MIDDLE, AND FULL SUMMER SESSIONS**
May 26, 2021	Last Day to Add/Drop Classes for **FIRST SUMMER SESSION**
May 28, 2021	Last Day to Add/Drop Classes for **MIDDLE SUMMER SESSION**
May 31, 2021	Last Day to Add/Drop Classes for **FULL SUMMER SESSION**
May 31, 2021	University Closed for Memorial Day
June 28, 2021	Last Day of **FIRST SUMMER SESSION**
July 4, 2021	University Closed for Independence Day
July 5, 2021	University Closed for Independence Day
July 7, 2021	First Day of **FTF SUMMER SESSION**
July 19, 2021	Last Day of **MIDDLE SUMMER SESSION**
August 2, 2021	Last Day of **FULL SUMMER SESSION**
August 16, 2021	Last Day of **FTF SUMMER SESSION**

Course Outline

Subjects	Section and Recommended Exercises
Systems of Linear Equations	1.1: 2 , 4, 10, 15, 18, 24, 29
Row Reduction and Echelon Form	1.2: 2 , 4, 8, 11, 13, 18, 20
Vector equations	1.3: 2 , 5, 9, 11, 13, 17, 24
Matrix Equations	1.4: 2 ,4,5,9, 17
Solutions of Linear Systems	1.5: 1 ,4,6,8,11,15, 23
Application to Chemistry (brief)	1.6: 7 , 9
Linear Independence	1.7: 1 ,4,6,7,14,16, 31
Linear Transformations	1.8: 2 ,4,7,9,13, 15
Matrix form of Linear Transformations	1.9: 5 ,7,10,15,18, 22
Matrix Operations	2.1: 4 ,7,9,16, 23
Inverse of a Matrix	2.2: 3 ,6,9,26,29, 32
Invertible Matrices	2.3: 2 ,6,9,11,13,14, 41
LU Factorization	2.5: 2 ,4,5,8,11,15, 17
Application to Computer Graphics (brief)	2.7: 1 ,2, 5
Introduction to Determinants	3.1: 3 ,8,9,12,22,24,25, 28
Properties of Determinants	3.2: 1 ,4,6,9,21,22,25, 26
Cramer's Rule	3.3: 2 ,5,8,11, 16
Vector Spaces and Subspaces	4.1: 8 ,24,30, 38
EXAM REVIEW, COMMON MIDTERM 6/21/2021	
Null Spaces and Columns Spaces	4.2: 2 ,4,14,20, 24
Linear Maps	4.3: 4 ,5,10,14,15, 21
Dimension of a Vector space	4.5: 2 ,4,6,9,13,15, 18
Rank	4.6: 1 ,2,5,9,13,17, 18
Application to Markov Chains (Brief)	4.9: 2 ,4,6, 8, 10
Eigenvalues and Eigenvectors	5.1: 3 ,7,9,13,15,17, 20
The Characteristic Equation	5.2: 4 ,7,9,13,15,16,20, 21
Diagonalization	5.3: 2 ,4,6,7,8,12,17, 21
Complex Eigenvalues	5.5: 4 ,5,13, 14
Inner Product, Length, and Orthogonality	6.1: 1 ,8,10,12,14,15,16, 20
Orthogonal Sets	6.2: 1 ,4,8,12,16,1720, 23
Orthogonal Projections	6.3: 2 ,4,6,8,10,12,14, 16
The Gram-Schmidt Procedure	6.4: 1 ,4,8,9, 12
Inner Product Spaces	6.7: 1 ,2,4,6, 8
Diagonalization of Symmetric Matrices	7.1: 1-10,14,17,22 , 26
Quadratic Forms	7.2: 2 ,5,7,10,13, 21
EXAM REVIEW	

| FINAL EXAM | July 19, 2021 |