MATH 337: Linear Algebra
Summer 2019 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 337-041	Professor J. Ratnaswamy
Math 337-141	Professor K. Bosler

Office Hours for All Math Instructors: Summer 2019 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 2019 Academic Calendar for the last day to withdraw based on the summer session you are registered for.

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 and Projects	25%
Common Midterm Exam	35%
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.

MATLAB: MATLAB is a mathematical software program that is used throughout the science and engineering curricula. Several MATLAB assignments will be given out. These assignments have been designed to help you learn how to use this software in order to visualize many of the concepts taught in class.

Projects: It is vital that you complete the required assignments by the specified dates.

Quiz Policy: A short quiz based on the homework problems will be given weekly.

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

Common Midterm Exam I	June 19, 2018
Final Exam	July 15, 2018

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 (Summer Hours: TBA)

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. 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:

- http://www5.njit.edu/studentsuccess/disability-support-services/

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

Date	Event
May 20, 2019	First Day of Classes
May 21, 2019	Last Day to Add/Drop Classes for **FIRST, MIDDLE, AND FULL**
May 27, 2019	University Closed for Memorial Day
June 24, 2019	Last Day of **FIRST SUMMER SESSION**
July 1, 2019	First Day of Second Summer Session
July 4-5, 2019	University Closed for Independence Day
July 15, 2019	Last Day of **MIDDLE SUMMER SESSION**
August 6, 2019	Last Day of **FULL AND SECOND SUMMER SESSIONS**

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 6/19/2019	
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: TUESDAY,~ JULY 15, 2019	