

MATH 337-H02: Linear Algebra - Honors *Spring 2021 Coordinated 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 Spring 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.

Please be sure you read and fully understand our [DMS Online Exam Policy](#).

COURSE INFORMATION

Course Description: Topics enhance those of Math 337 and concepts are studied in detail. Matrices, determinants, systems of linear equations, vector spaces, linear transformations, eigenvalues, eigenvectors, and related topics.

Number of Credits: 3

Prerequisites: [MATH 112H](#) with a grade of B or better or [MATH 112](#) with a grade of A.

Course-Section and Instructors

Course-Section	Instructor
Math 337-H02	Professor T. Askham

Office Hours for All Math Instructors: [Spring 2021 Office Hours and Emails](#)

Required Textbook:

Title	<i>Linear Algebra and its Applications</i>
Author	Lay
Edition	5th
Publisher	Pearson
ISBN #	978-0321982384

University-wide Withdrawal Date: The last day to withdraw with a W is **Monday, April 5, 2021**. It will be strictly enforced.

SPECIAL NOTE - SPRING 2021

- Teaching will be done online using WebEx.
- MatLab assignments should be submitted electronically through Canvas.
- Quizzes will be assigned on Canvas and submitted through Canvas.
- Exams will be done online through Canvas using appropriate technology (i.e. Respondus with Lockdown Browser).

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 I	20%
Common Midterm Exam II	20%
Final Exam	35%

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 two common midterm exams held during the semester and one comprehensive common final exam.

Exams will be proctored using both Respondus LockDown+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.

Exams are held on the following days:

Common Midterm Exam I	February 24, 2021
Common Midterm Exam II	April 14, 2021
Final Exam Period	May 7 - 13, 2021

The time of the midterm exams is **4:15-5:40 PM** for daytime students and **5:45-7:10 PM** for evening students. 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 and put away during all class times.

ADDITIONAL RESOURCES

Math Tutoring Center: Located in the Central King Building, Lower Level, Rm. G11 (See: **Spring 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 Accessibility 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 (OARS) website at:

- <https://www.njit.edu/studentssuccess/accessibility/>

Important Dates (See: **Spring 2021 Academic Calendar, Registrar**)

Date	Day	Event
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January 19, 2021	T	First Day of Classes
January 23, 2021	S	Saturday Classes Begin
January 25, 2021	M	Last Day to Add/Drop Classes
March 14 - March 21, 2021	Su - Su	Spring Recess - No Classes
April, 2, 2021	F	Good Friday - No Classes
April 5, 2021	M	Last Day to Withdraw
May 4, 2021	T	Friday Classes Meet
May 4, 2021	T	Last Day of Classes
May 5 & May 6, 2021	W & R	Reading Days
May 7 - May 13, 2021	F - R	Final Exam Period

Course Outline

***APPLICATION SECTIONS IN RED**

Week	Subjects	Section and Recommended Exercises
1	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
2	Matrix Equations	1.4: 2,4,5,9,17
	Solutions of Linear Systems	1.5: 1,4,6,8,11,15,23
3	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
4	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
5	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
6	Exam Review	
COMMON MIDTERM #1 WEDNESDAY - FEBRUARY 24, 2021		
	Introduction to Determinants	3.1: 3,8,9,12,22,24,25,28
7	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
8	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
9	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
10	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
11	Inner Product, Length, and Orthogonality	6.1: 1,8,10,12,14,15,16,20
	Orthogonal Sets	6.2: 1,4,8,12,16,17,20,23
	Orthogonal Projections	6.3: 2,4,6,8,10,12,14,16
12	Exam Review	
COMMON MIDTERM #2 WEDNESDAY - APRIL 14, 2021		
	The Gram-Schmidt Procedure	6.4: 1,4,8,9,12, 13-16
13	Inner Product Spaces	6.7: 1,2,4,6,8
	Diagonalization of Symmetric Matrices	7.1: 1-10,14,17,22,26
14	Quadratic Forms	7.2: 2,5,7,10,13,21
	Exam Review	

MATLAB Projects for M337: Linear Algebra, Spring 2021

MATLAB assignments will be distributed through Canvas. There will be approximately 3-4 assignments which will count toward the quizzes and projects category of the final grade.

For help with MATLAB, the math department has MATLAB TA's. Click for [locations and times](#) when they are available.

*Updated by Professor T. Askham - 2/5/2021
Department of Mathematical Sciences Course Syllabus, Spring 2021*