

## MATH 631 : Linear Algebra

### *Fall 2020 Graduate 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:** Similar in aim and content to **MATH 630** but with more emphasis on mathematical rigor. Linear systems of equations, matrix algebra, linear spaces, orthogonality, eigenvalues and eigenvectors, diagonalization, and matrix decomposition. Applications.

**Number of Credits:** 3

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

**Course-Section and Instructors**

Course-Section	Instructor
Math 631-001	Professor T. Askham

**Office Hours for All Math Instructors:** [Fall 2020 Office Hours and Emails](#)

**Reference Textbooks:**

Title	<i>Linear Algebra and its Applications</i>	Numerical Linear Algebra
Author	Peter Lax	Trfethen and Bau
Edition	2nd ed.	1st
Publisher	Wiley	SIAM
ISBN #	978-0471751564	978-0-898713-61-9

**Both texts will be on reserve at the library.**

**University-wide Withdrawal Date:** The last day to withdraw with a W is **Monday, November 9, 2020**. 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: numerically solving a system of equations and computing with 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

**Course Assessment:** Assessment will be performed with homework assignments, a midterm exam, and a final exam that will test the understanding of the above concepts. Assignments will be distributed, collected, and graded using Canvas.

---

## 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	40%
Midterm Exam	30%
Final Exam	30%

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	< 60

**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.

**Exams:** There will be one midterm exam held online (details below) during the semester and one comprehensive final exam (also held online). Exams are held on the following days:

Midterm Exam	October 21, 2020
Final Exam Period	December 15 - 21, 2020

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. NJIT policy requires that all midterm and final exams must be proctored, regardless of delivery mode, in order to increase academic integrity. Note that this does not apply to essay or authentic based assessments.

Effective beginning Fall semester 2019, students registered for a fully online course section (e.g., online or Hyflex mode) must be given the option to take their exam in a completely online format, with appropriate proctoring.

In this course you will be required to use the following proctoring method to ensure academic integrity for exams. Please see NJIT's response to questions about online proctoring <https://www5.njit.edu/provost/response-questions-about-online-proctoring/> . See below for more information about how exams will be proctored in this course.

## Webex

Webex can be used to allow instructors to proctor exams themselves. Your instructor will schedule a Webex exam session and share the meeting information with you ahead of time. The exam in Canvas will be password-protected. You can connect to the Webex session with either your phone or computer. You can find links to download the mobile app from the App Store or Google Play Store at the bottom of [njit.webex.com](http://njit.webex.com) .

When your instructor is ready to start the exam, they will provide the exam password in the meeting so all students can begin the Canvas quiz. Your instructor will then watch you, via the web camera, as you take the exam. Students are expected to remain connected to the Webex session until their exam is submitted. The session may also be recorded by your instructor.

In order to use Webex for proctored exams, you will need the following:

High-speed internet connection

Webcam (internal or external) and/or smartphone with camera (instructor's preference)

The process for connecting to Webex will be the same as when you connect for a class.

Tips for ensuring a smooth experience while using Webex:

Connect to your Webex session before class starts.

Log into Canvas before connecting to Webex.

Questions or problems can be submitted via web form by going to: <https://servicedesk.njit.edu> and clicking on the "Report your issue online" link. You may also call the IST Service Desk with any questions at 973-596-2900.

**Submitting Exams:** exams will be submitted through the standard assignment interface in Canvas. Written portions of exams will need to be scanned and uploaded as a PDF within 10 minutes of the end of the exam period (there are many scanning technologies available for cell phones, reach out to the professor if you would like some recommendations.)

**Technical Issues:** Technical issues may occur in such a testing environment, making it difficult to ensure exam integrity. At the professor's discretion, a student may need to retake an exam in the case of a technical issue which either prevents a good connection to the Webex meeting or timely submission of the exam materials in Canvas.

**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](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

**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](tel:973-596-5417) or via email at [lyles@njit.edu](mailto:lyles@njit.edu). The office is located in Kupfrian Hall, Room 201. A Letter of Accommodation Eligibility from the Disability Support 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 Disability Support Services (DSS) website at:

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

Important Dates (See: [Fall 2020 Academic Calendar](#), Registrar)

Date	Day	Event
September 1, 2020	T	First Day of Classes
September 5, 2020	S	Saturday Classes Begin
September 7, 2020	M	Labor Day
September 8, 2020	T	Monday Classes Meet
September 8, 2020	T	Last Day to Add/Drop Classes
November 9, 2020	M	Last Day to Withdraw
November 25, 2020	W	Friday Classes Meet
November 26-29, 2020	R - Su	Thanksgiving Recess - University Closed
December 10, 2020	R	Last Day of Classes
December 11 & 14, 2020	F & M	Reading Days
December 15 - 21, 2020	T - M	Final Exam Period

## Course Outline

Lecture	Section of Notes	Topic
1 - 3	1	Basic theory in the abstract setting
5 - 8	2-3	Matrices and the determinant
9-11	4	Algebraic spectral theory
12-14	5	Inner products and norms
15	<b>MIDTERM EXAM (SECTIONS 1-4 OF NOTES) - 10/21</b>	
16-20	6	Analytic spectral theory
21-28	7	Matrices in practice

*Updated by Professor T. Askham - 8/27/2020  
Department of Mathematical Sciences Course Syllabus, Fall 2020*