NJIT New Jersey's Science & Technology University

THE COLLEGE OF SCIENCE AND LIBERAL ARTS

THE DEPARTMENT OF MATHEMATICAL SCIENCES

MATH 391: Numerical Linear Algebra
Fall 2020 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: This course provides an introduction to computational linear algebra. Topics include direct solution of linear systems, iterative methods for linear systems, fast Fourier transforms, least squares problems, singular value decomposition and eigenvalue/eigenvector problems.

Number of Credits: 3

Prerequisites: MATH 337 with a grade of C or better and CS 113 with a grade of C or better or CS 115 with a grade of C or better or CS 101with a grade of C or better or CS 100 with a grade of C or better.

Course-Section and Instructors

Course-Section	Instructor
Math 391-001	Professor D. Shirokoff

Office Hours for All Math Instructors: Fall 2020 Office Hours and Emails

Required Textbook:

Title	*Numerical Linear Algebra and Applications*
Author	Datta
Edition	2nd
Publisher	SIAM
ISBN #	978-0898716856

University-wide Withdrawal Date: The last day to withdraw with a **W** is **Monday, November 9, 2020**. It will be strictly enforced.

ONLINE LECTURES AND HOMEWORK

The following policies will only apply in the event of a coronavirus resurgence and university mandate requiring online course delivery:

Lectures

- Meetings will occur online via Webex at the same times originally specified in the syllabus: 4:00-5:20pm TF (with exceptions specified in the NJIT calendar).
- Webex lectures will be recorded made available on Canvas, to be viewed by class members at any time.
- Office hours will be conducted via Webex during the same in-class times reserved throughout the semester.
- Students will receive email invitations to join Webex meetings and office hours.

Updated Grading Policy

- Written homework will be submitted and returned through Canvas.
- Midterms and Final exams will be conducted during the same dates and times as originally scheduled. However, exams will be conducted online through Canvas using a lockdown browser and monitoring software. In the event of online exams, additional information will follow.

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/Projects	45%
Midterm Exam	25%
Final Exam	30%

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

A	90 - 100	**C**	65 - 74
B+	85 - 89	**D**	55 - 64
B	80 - 84	**F**	0 - 54
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.

Homework/ Project/Quiz Policy: There will be regular homework assignments from the text and computing assignments using MATLAB. Students are advised to do as many homework problems in the textbook as possible. Quizzes will be held at least biweekly. It is advisable that students familiarize themselves with MATLAB as early as possible. Several MATLAB resources are listed on p. 78 of the text. There will be MATLAB TAs who can assist with assignments. Times for MATLAB help will be announced shortly after the beginning of the semester.

Exams: There will be one midterm exam held in class during the semester and one comprehensive final exam. The final exam will be held during the following week:

Midterm Exam	October 20, 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.

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 Cullimore, Room 214 (See: Fall 2020 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.

All students must familiarize themselves with and adhere to the Department of Mathematical Sciences Course Policies, in addition to official university-wide policies. The Department of Mathematical Sciences takes these policies very seriously and enforces them strictly.

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 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	Sections	Topic
1 - 3	2.1-2.5	Linear Algebra Review /MATLAB basics
3 - 4	3.1-3.8	Floating Point Numbers – Computation Errors
5 - 6	4.1-4.3, 4.6-4.7	Efficiency; Stability – Perturbation Analysis for Linear Systems
7 - 9	5.1-5.4	Solving Linear Systems with Gaussian Elimination; LU Factorization
10 - 12	6.1-6.8, 6.11-6.12	Linear Systems – Numerical Solutions
13 - 14		**REVIEW AND MIDTERM**
15 - 18	7.1-7.8	Decompositions: QR, SVD; Projections
19 - 22	8.2-8.8	Solving Systems with Least Squares
23 - 25	9.1-9.2, 9.4-9.6	Calculating Eigenvalues and Eigenvectors
26 - 27	12.1-12.2	Iterative Methods for Large and Sparse Problems
28		**REVIEW**