

Fall 2023

MATH 391-001, Fall 2023: Numerical Linear Algebra

Michael Siegel

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Siegel, Michael, "MATH 391-001, Fall 2023: Numerical Linear Algebra" (2023). *Mathematical Sciences Syllabi*. 217.

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THE DEPARTMENT OF MATHEMATICAL SCIENCES

MATH 391: Numerical Linear Algebra

Fall 2023 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 101** with 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 M. Siegel

Office Hours for All Math Instructors: **Fall 2023 Office Hours and Emails**

Required Textbook:

Title	<i>Numerical Linear Algebra and Applications</i>
Author	Datta
Edition	2nd
Publisher	SIAM
ISBN #	978-0898716856

University-wide Withdrawal Date: The last day to withdraw with a W is **Monday, November 13, 2023**. It will be strictly enforced.

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	50%
Midterm Exam	20%
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. 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.

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

Midterm Exam	Week 7
Final Exam Period	December 17 - December 23, 2023

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 the Central King Building, Lower Level, Rm. G11 (See: **Fall 2023 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](#).

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 need an accommodation due to a disability, please contact the Office of Accessibility Resources and Services at oars@njit.edu, or visit Kupfrian Hall 201 to discuss your specific needs. A Letter of Accommodation Eligibility from the office authorizing student accommodations is 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/accessibility/>

Important Dates (See: [Fall 2023 Academic Calendar](#), [Registrar](#))

Date	Day	Event
September 4, 2023	Monday	Labor Day
September 5, 2023	Tuesday	First Day of Classes
September 11, 2023	Monday	Last Day to Add/Drop Classes
November 13, 2023	Monday	Last Day to Withdraw
November 21, 2023	Tuesday	Thursday Classes Meet
November 22, 2023	Wednesday	Friday Classes Meet
November 23 to November 26, 2023	Thursday and Saturday	Thanksgiving Recess - Closed
December 13, 2023	Wednesday	Last Day of Classes
December 14, 2023	Thursday	Reading Day 1
December 15, 2023	Friday	Reading Day 2
December 17 to December 23, 2023	Sunday to Saturday	Final Exam Period

Course Outline

Week	Topic
1	<i>Linear Algebra Review</i>
2	<i>Error Analysis</i>
3	<i>Efficiency, Stability, Condition Number</i>

4 - 6	<i>Numerical Methods for Solving Linear Systems, Gaussian Elimination, LU Factorization</i>
7	<i>Review and Midterm</i>
8 - 9	<i>QR, SVD, Projections</i>
10 - 11	<i>Least Squares</i>
12 - 13	<i>Calculating Eigenvalues and Eigenvectors</i>
13 - 14	<i>Iterative Methods for Large and Sparse Problems</i>

Updated by Professor M. Siegel - 8/10/2023
Department of Mathematical Sciences Course Syllabus, Fall 2023