

MATH 614: Numerical Methods I

Spring 2022 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.

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

COURSE INFORMATION

Course Description: Theory and techniques of scientific computation, with more emphasis on accuracy and rigor than Math 611. Machine arithmetic. Numerical solution of a linear system and pivoting. Interpolation and quadrature. Iterative solution of nonlinear systems. Computation of eigenvalues and eigenvectors. Numerical solution of initial- and boundary-value problems for systems of ODEs. Applications. The class includes examples requiring student use of a computer.

Number of Credits: 3

Prerequisites: [Math 222](#), [Math 337](#), [Math 340](#), and proficiency in a computer language (MATLAB, FORTRAN, C, or C++), or departmental approval.

Course-Section and Instructors:

Course-Section	Instructor
Math 614-008	Professor Y. Young

Office Hours for All Math Instructors: [Spring 2022 Office Hours and Emails](#)

Required Textbook:

Title	<i>An Introduction to Numerical Analysis</i>
Author	Atkinson
Edition	2nd
Publisher	John Wiley & Sons, Inc.
ISBN #	0-471-62489-6

Recommended Textbooks	<p>A First Course in the Numerical Analysis of Differential Equations (2nd edition), by Arieh Iserles, University of Cambridge ISBN 9780511995569</p> <p>Numerical Analysis, L. Ridgway Scott, Princeton University Press, 2011 ISBN 9780691146867</p>
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University-wide Withdrawal Date: The last day to withdraw with a W is **Monday, April 4, 2022**. It will be strictly enforced.

COURSE GOALS

Course Objectives

Students will gain experience in developing, analyzing, and implementing common numerical methods for a range of mathematical problems.

Course Outcomes

- Students should gain an understanding of common numerical methods.
- Students should know how to apply numerical methods to various mathematical problems.
- Students should have an improved ability to derive and program numerical methods.

Course Assessment: Outcomes are assessed through homework assignments, a midterm exam, and a comprehensive final exam.

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	30%
Midterm Exam	35%
Final Exam	35%

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

A	90 - 100	C +	75 - 79
B+	86 - 89	C	70 - 75
B	80 - 85	F	0 - 69

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**.

Homework: Homework assignments/projects will be given frequently; some will involve writing computer programs in a computer language such as C, FORTRAN, or Matlab. Each assignment must be handed in at the beginning of class. Late assignments are NOT accepted. Assignments will be graded for correctness, completion, and clarity.

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

Midterm Exam	March 10, 2022
Final Exam Period	May 6 - May 12, 2022

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

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 are in need of accommodations due to a disability please contact Scott Janz, Associate Director of Disability Support Services at **973-596-5417** or via email at **scott.p.janz@njit.edu**. The office is located in Kupfrian Hall, Room 201. A Letter of Accommodation Eligibility from the Office of Accessibility Resources and 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 Office of Accessibility Resources and Services (OARS) website at:

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

Important Dates (See: **Spring 2022 Academic Calendar, Registrar**)

Date	Day	Event
January 18, 2022	Tuesday	First Day of Classes

January 22, 2022	Saturday	Saturday Classes Begin
January 24, 2022	Monday	Last Day to Add/Drop Classes
March 14, 2022	Monday	Spring Recess Begins
March 19, 2022	Saturday	Spring Recess Ends
April 4, 2022	Monday	Last Day to Withdraw
April 15, 2022	Friday	Good Friday - No Classes
April 17, 2022	Sunday	Easter Sunday - No Classes
May 3, 2022	Tuesday	Friday Classes Meet
May 3, 2022	Tuesday	Last Day of Classes
May 4 - May 5, 2022	Wednesday and Thursday	Reading Days
May 6 - May 12, 2022	Friday to Thursday	Final Exam Period

Course Outline

Week	Topics
1	<i>Intro</i>
2	<i>Errors</i>
3	<i>Root-finding</i>
4	<i>Function approximation and interpolation</i>
5	<i>Function approximation and interpolation</i>
6	<i>Function approximation and interpolation</i>
7	<i>Numerical integration</i>
8	<i>MIDTERM (MARCH 10)</i>
***	<i>Spring Recess</i>
9	<i>Numerical integration</i>
10	<i>Numerical ODE</i>
11	<i>Numerical ODE</i>
12	<i>Numerical ODE</i>
13	<i>Iterative methods for linear systems</i>
14	<i>Iterative methods for linear systems</i>

*Updated by Professor Y. Young - 1/13/2022
Department of Mathematical Sciences Course Syllabus, Spring 2022*