MATH 340: Applied Numerical Methods
Fall 2026 Course Syllabus

NJIT Academic Integrity Code: Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the Code of Student Conduct and Academic Integrity Policy that is found at: Code of Student Conduct and Academic Integrity Policy.

Please note that I am required to report any suspected academic misconduct to the Office of the Dean of Students. Academic misconduct includes, but is not limited to, cheating, plagiarism, and the inappropriate use of online tools or software. Students who are found responsible for violating the Academic Integrity Code may be subject to disciplinary action. Possible outcomes can include a failing grade on an assignment or in the course, as well as additional sanctions up to and including suspension or dismissal from the university. If you have questions about the Code of Student Conduct and Academic Integrity or the student conduct process, you may contact communitystandards@njit.edu.

COURSE INFORMATION

Course Description: Introduction to numerical methods with emphasis on mathematical models. Implements and investigates numerical techniques for the solution of linear and nonlinear systems of equations, eigenvalue problems, interpolation and approximation, techniques of optimization, Monte Carlo methods, and applications to ordinary differential equations and integration.

Number of Credits: 3

Prerequisites: MATH 211 with a grade of C or better or MATH 213 with a grade of C or better, and CS 100 with a grade of C or better or CS 101 with a grade of C or better or CS 113 with a grade of C or better or CS 115 with a grade of C or better or MATH 240 with a grade of C or better.

Course-Section and Instructors:

Course-Section	Instructor
Math 340-001	Professor V. Matveev

Office Hours for All Math Instructors: Fall 2026 Office Hours and Emails

Recommended Textbook:

Title	*Numerical Analysis*
Author	Timothy Sauer
Edition	3rd
Publisher	978-0134696454 / 978-0137982189 (eText)
ISBN #	Pearson

University-wide Withdrawal Date: The last day to withdraw with a **W** is **Tuesday, November 10, 2026**. It will be strictly enforced.

Course Outcomes

Students will demonstrate the ability to:

- Analyze errors arising in numerical computation of solutions to mathematical and applied problems.
- Apply numerical techniques to compute approximate solutions of nonlinear equations and differential equations and analyze error issues.
- Apply numerical techniques for interpolation, differentiation and quadrature problems and analyze error issues.
- Communicate advantages and disadvantages of various numerical techniques and select appropriate numerical methods to solve specific problems.
- Translate numerical problems and methods into computational algorithms, apply the algorithms and develop conclusions from the output.

Course Assessment: The assessment of outcomes will be achieved through homework, MATLAB assignments, quizzes, and exams.

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	13%
Lab assignments	13%
Quizzes	18%
Midterm Exam	24%
Final Exam	32%

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

A	90 - 100	**C**	60 – 67
B+	82 - 89	**D**	53 - 59
B	75 - 81	**F**	52 and below
C+	68 – 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.

Religious Observance: NJIT is committed to supporting students observing religious holidays. Students must notify their instructors in writing of any conflicts between course requirements and religious observances, ideally by the end of the second week of classes and no later than two weeks before the anticipated absence.

Homework and Lab assignments: Homework and lab assignments REQUIRE use of MATLAB software. Credit for homework solutions will be given based on justified and legible solutions: answers without solutions or poorly legible

solutions will receive no credit.

Quizzes: Short quizzes will be given about once a week at start of class on a pre-announced topic.

Policy on use of AI tools: Artificial Intelligence (AI) has great pedagogical potential and may help students understand course material, providing a useful additional resource when learning methods to prepare for exams, solve homework problems and complete lab assignments. However, students may ***not*** copy ***any*** part of AI output without modification to complete assignments: by submitting your work, you are testifying that you are submitting your own work, and may be asked to explain your solution by your instructor before the grade for a given assignment is finalized. As the exams are in person and without use of electronic resources, the use of AI is not relevant for the exams as planned.

Exams: There will be four exams during the semester and a final exam during the final exam week. The tentative dates are:

Midterm Exam I	October 22, 2026
Final Exam Period	December 16 - December 22, 2026

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 2026 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 2026 Academic Calendar, Registrar)

Date	Day	Event
September 1, 2026	Tuesday	First Day of Classes
September 5, 2026	Saturday	Saturday Classes Begin
September 7, 2026	Monday	Labor Day. University Closed
September 8, 2026	Tuesday	Last Day to Add/Drop Classes
September 8, 2026	Tuesday	Conversion Day - Monday Classes Meet
October 2, 2026	Friday	Wellness Day
November 10, 2026	Tuesday	Last Day to Withdraw
November 25, 2026	Wednesday	Conversion Day - Friday Classes Meet
November 26 to November 29, 2026	Thursday and Sunday	Thanksgiving Recess - Closed
December 11, 2026	Friday	Friday Classes Meet - Make up for Wellness Day
December 12, 2026	Saturday	Saturday Classes Meet
December 13, 2026	Sunday	Last Day of Classes
December 14, 2026	Monday	Reading Day 1
December 15, 2026	Tuesday	Reading Day 2
December 16 to December 22, 2026	Wednesday to Tuesday	Final Exam Period

Course Outline

Lecture/Date	Sections	Topic
#1 (9/1)	0.1, 0.5	Calculus review: Intermediate & Mean Value Theorems; Taylor Series
#2 (9/3)	0.5	Calculus review: forming Taylor series by composition
LAB (9/4)	**Lab session 1: MATLAB basics & Taylor series**	
#3 (9/10)	0.2-0.3	Binary number system, IEEE floating-point standard
LAB (9/11)	**Lab session 2: Double precision and loss of significance**	
#4 (9/15)	0.4	Loss of Significance

#5 (9/17)	1.1-1.2	Root-finding: the bisection method and fixed-point iteration
LAB (9/18)	**Lab session 3: Fixed-point iteration and bisection**	
#6 (9/22)	1.2	Fixed-point iteration (continued)
#7 (9/24)	1.4	Newton's method and Its error
LAB (9/25)	**Lab session 4: Newton's method and its extensions**	
#8 (9/29)	1.4	Variations of Newton's method; Newton's method in higher dimensions
#9 (10/1)	1.5	Root-finding w/o derivatives: secant method & false position method
#10 (10/6)	4.1	Least Squares approximation
#11 (10/8)	4.1-4.2	Least Squares approximation: additional methods
LAB (10/9)	**Lab session 5: Least-squares parameter estimation**	
#12 (10/13)	3.1	Polynomial Interpolation; Lagrange polynomials
#13 (10/15)	3.2	Polynomial Interpolation; Newton's divided differences
LAB (10/16)	**Lab session 6: Polynomial Interopolation**	
Review (10/20)	**REVIEW FOR THE MIDTERM EXAM**	
Exam (10/22)	**MIDTERM EXAM**	
#14 (10/27)	3.3	Polynomial Interpolation using Chebyshev polynomials
#15 (10/29)	3.4	Basics of polynomial splines
LAB (10/30)	**Lab session 7: Chebyshev polynomials**	
#16 (11/3)	5.1	Numerical differentiation
#17 (11/5)	5.1	Numerical differentiation
LAB (11/6)	**Lab session 8: Numerical differentiation**	
#18 (11/10)	5.2	Numerical integration: Trapezoidal & Simpson's rule
#19 (11/12)	5.2	Numerical integration: general Newton-Cotes methods
LAB (11/13)	**Lab session 9: Numerical integration**	
#20 (11/17)	5.3	Romberg Integration and Richardson extrapolation
#21 (11/19)	5.5	Gauss-Legendre Quadrature
LAB (11/20)	**Lab session 10: Numerical Integration (Continued)**	
#22 (11/24)	6.1	ODEs: Introduction & The Forward Euler's method
LAB (11/25)	**Lab session 11: Numerical ODEs using Euler method**	
#23 (12/1)	6.1-6.2	ODEs: Taylor series methods
#24 (12/3)	6.4	ODEs: Runge Kutta methods
LAB (12/4)	**Lab session 12: Numerical ODEs using Runge-Kutta Methods**	
#25 (12/9)	6.6	ODEs: accuracy and stability of numerical methods
Review (12/10)	**REVIEW FOR FINAL EXAM**	
12/16-12/22	**FINAL EXAM WEEK**	