MATH 328: Mathematical Methods for Scientists and Engineers
Spring 2025 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: The course exposes students to concepts of mathematics encountered throughout the physical science and engineering disciplines. Topics include matrix algebra, vector analysis, complex numbers, and boundary value problems in partial differential equations. Effective From: Spring 2009.

Number of Credits: 3

Prerequisites: Math 211 with a grade of C or better, or Math 213 with a grade of C or better. Corequisite: Math 222.

Course-Section and Instructors:

Course-Section	Instructor
Math 328-002	Professor W. Choi

Office Hours for All Math Instructors: Spring 2025 Office Hours and Emails

Required Textbook:

Title	*Mathematical Methods in the Physical Sciences*
Author	Boas
Edition	3rd
Publisher	John Wiley & Sons, Inc.
ISBN #	978-0471198260

University-wide Withdrawal Date: The last day to withdraw with a **W** is **Monday, April 7, 2025**. It will be strictly enforced.

COURSE GOALS

Course Objectives: Learn some fundamental mathematical methods that are used extensively by physicists and engineers, including linear algebra, vector analysis, Fourier analysis, partial differential equations, and complex analysis.

Course Outcomes: Students will be able to use these basic mathematical methods listed above to solve the problems that are frequently encountered in their own fields such as physics and other engineering disciplines.

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:

Quiz/HW	20%
Midterm Exam I	20%
Midterm Exam II	25%
Final Exam	35%

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

A	88 - 100	**C**	56 - 65
B+	81 - 87	**D**	46 - 55
B	71 - 80	**F**	0 - 45
C+	66 - 70		

Attendance Policy: Attendance at all classes 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.

Readings: You will be expected to read the textbook. For maximum benefit, you should do this before each lecture or immediately after. Readings are from Boas.

Quizzes/Homeworks: Quizzes will be given roughly every two weeks in class. The problems for these quizzes will be similar to problems assigned in each class. Weekly homework will be assigned and will be collected via Canvas. The uploaded homework should be in .pdf format and should be done using a document scanning app (not a photo).

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

Midterm Exam 1	February 19, 2025
Midterm Exam 2	April 9, 2025
Final Exam Period	May 10 - May 16, 2025

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.

AI usages: This course expects students to work without artificial intelligence (AI) assistance in order to better develop their skills in this content area. As such, AI usage is not permitted throughout this course under any circumstance.

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: Spring 2025 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 are in need of accommodations due to a disability please If you need an accommodation due to a disability please contact the Office of Accessibility Resources and Services at oars@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/accessibility/

Important Dates (See: Spring 2025 Academic Calendar, Registrar)

Date	Day	Event
January 21, 2025	Tuesday	First Day of Classes
January 27, 2025	Monday	Last Day to Add/Drop Classes
March 16, 2025	Sunday	Spring Recess Begins
March 22, 2025	Saturday	Spring Recess Ends
April 3, 2025	Thursday	Wellness day
April 7, 2025	Monday	Last Day to Withdraw
April 18, 2025	Friday	Good Friday - No Classes
April 20, 2025	Sunday	Easter Sunday - No Classes Scheduled
May 6, 2025	Tuesday	Thursday Classes Meet
May 7, 2025	Wednesday	Friday Classes Meet
May 7, 2025	Wednesday	Last Day of Classes
May 8, 2025	Thursday	Reading Day 1
May 9, 2025	Friday	Reading Day 2
May 10 - May 16, 2025	Friday to Thursday	Final Exam Period

Course Outline

Meeting	Subject	Reading
WEEK 1:	Linear Algebra I: Matrices, Row reduction	Sec. 3.2: 3, 6, 10
WEEK 2:	Linear Algebra II: Determinants, Linear dependence, Special matrices	Sec. 3.3: 2, 3 Sec. 3.8: 2, 18
	Linear Algebra III: Eigenvalue problems	Sec 3.11: 14, 21, 26

WEEK 3:	Linear Algebra IV: Diagonalization, Applications	Sec. 3.12: 14
	Vector Analysis I: Vector Fields	Sec. 6.3: 1, 2 Sec. 6.4: 2, 5
WEEK 4:	Vector Analysis II: Conservative Fields	Sec. 6.6: 2, 3, 8 Sec. 6.7: 7, 19
	Vector Analysis III: Integral Theorems	Sec. 6.8: 1, 6, 12 Sec. 6.9: 3, 4
WEEK 5:	Vector Analysis IV: Integral Theorems (Continued)	Sec. 6.10: 1, 4, 6 Sec. 6.11: 2, 8, 11
	Midterm Exam I	Chap. 3 and Chap. 6
WEEK 6:	Fourier Analysis I: Fourier Series	Sec. 7.2: 4, 6, 9
	Fourier Analysis II: Convergence/Periodic Extensions	Sec. 7.6: 7,10
WEEK 7:	Fourier Analysis III: Complex Fourier Series	Sec. 7.7: 1, 10 Sec. 7.8: 11
	Fourier Analysis IV: Parseval's Theorem	Sec. 7.9: 12, 23
WEEK 8:	Fourier Analysis V: Fourier Transform	Sec. 7.12: 3, 16, 19
	PDE I: Introduction	Sec. 13.1: 2(a)
	PDE II: Laplace Equation	Sec. 13.2: 2, 13

WEEK 9:	PDE III: Heat Equation	Sec. 13.3: 8, 9
WEEK 10:	PDE IV: Wave equation	Sec. 13.4: 2, 5
	PDE V: PDEs in circular geometries	Sec. 13.5: 4, 12
WEEK 11:	PDE VI: Fourier Transform	Sec. 13.9: 2, 4
	Midterm Exam II	Chap. 7 and Chap. 13
WEEK 12:	Complex Analysis I: Introduction	Sec. 14.1: 11, 19, 21
	Complex Analysis II: Analytic Functions	Sec. 14.2: 19, 24, 34, 38, 45
WEEK 13:	Complex Analysis III: Contour Integrals	Sec. 14.3: 2, 7, 20, 22
	Complex Analysis IV: Residue Theorem	Sec. 14.4: 5, 11
WEEK 14:	Complex Analysis V: Applications	Sec. 14.6: 17, 32 Sec. 14.7: 16
	Complex Analysis VI: Conformal Mapping	Sec. 14.10: 4, 7
WEEK 15:	**REVIEW FOR FINAL EXAM**	