MATH 651: Methods of Applied Mathematics I
Fall 2024 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: A survey of mathematical methods for the solution of problems in the applied sciences and engineering. Topics include: ordinary differential equations and elementary partial differential equations. Fourier series, Fourier and Laplace transforms, and eigenfunction expansions.

Number of Credits: 3

Prerequisites: MATH 222 or departmental approval.

Course-Section and Instructors:

Course-Section	Instructor
Math 651-001	Professor M. Booty

Office Hours for All Math Instructors: Fall 2024 Office Hours and Emails

Required Textbook:

There is no required book for the course. Course material will be drawn from the following sources, which are on reserve in the library.

Recommended Textbooks:

1) Advanced Mathematical Methods for Scientists and Engineers: Asymptotic Methods and Perturbation Theory. By Carl M. Bender and Steven A. Orszag.
2) Advanced Analytic Methods in Applied Mathematics, Science and Engineering. By Hung Cheng.
3) Nonlinear Dynamics and Chaos. By Steven H. Strogatz
4) Elementary Applied Partial Differential Equations, with Fourier Series and Boundary Value Problems. By Richard Haberman.

University-wide Withdrawal Date: The last day to withdraw with a **W** is **Monday, November 11, 2024**. 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	55%
Midterm Exams (2)	15%
Final Exam	30%

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

A	87 - 100	**C**	62 - 67
B+	81 - 86	**D**	55 - 61
B	75 - 80	**F**	0 - 54
C+	68 - 74		

Homework Policy: Homework assignments will be given frequently. Assignments must be submitted by the due date. Late assignments are NOT accepted. Solutions will be graded for correctness, completeness, and clarity.

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

Midterm Exam	TBD
Final Exam Period	12/16 to 12/21

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 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 2024 Academic Calendar, Registrar)

Date	Day	Event
September 2, 2024	Monday	Labor Day
September 3, 2024	Tuesday	First Day of Classes
September 9, 2024	Monday	Last Day to Add/Drop Classes
November 11, 2024	Monday	Last Day to Withdraw
November 26, 2024	Tuesday	Thursday Classes Meet
November 27, 2024	Wednesday	Friday Classes Meet
November 28 to December 1, 2024	Thursday and Sunday	Thanksgiving Recess - Closed
December 11, 2024	Wednesday	Last Day of Classes
December 12, 2024	Thursday	Reading Day 1
December 13, 2024	Friday	Reading Day 2
December 15 to December 21, 2024	Sunday to Saturday	Final Exam Period

Course Outline

Week	Dates	Topic
1	9/3 and 9/5	Linear ordinary differential equations (ODEs), definitions and theory. Linear homogeneous equations, examples
2	9/10 and 9/12	Inhomogeneous equations: methods and solution techniques
3	9/17 and 9/19	More examples and solution techniques. Cauchy-Euler equations
4	9/24 and 9/26	Regular and singular points of linear ODEs. Series solutions

5	10/1 and 10/3	The method of Frobenius, examples. Nonlinear ODEs: theory, methods and examples. Singular points in the phase plane
6	10/8 and 10/10	Nonlinear ODEs, examples. Numerical solution of an initial value problem. Some basic methods and examples.
7	10/15 and 10/17	Introduction to partial differential equations (PDEs). Definitions and examples. Linear PDEs
8	10/22 and 10/24	Separation of variables and the Sturm-Liouville eigenvalue problem
9	10/29 and 10/31	Examples. Inhomogeneous boundary conditions and Green's theorem
10	11/5 and 11/7	Solution of linear PDEs by eigenfunction expansion, examples
11	11/12 and 11/14	Higher spatial dimensions and different geometries. Eigenvalues of the Laplacian
12	11/19 and 11/21	Solution of linear PDEs by Fourier and Laplace Transforms
13	11/26 and 12/3	Solution of linear PDEs by Fourier and Laplace Transforms
14	12/5 and 12/10	Additional Topics

Updated by Professor M. Booty - 8/2024
Department of Mathematical Sciences Course Syllabus, Fall 2024