MATH 322: Differential Equations for Applications
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: An applied science study using differential equations as the vehicle for comprehension of the unknown. Introduction to first-order differential equations and their applications to motion, cooling and electromechanical systems followed by higher order differential equations and their solutions. And includes Laplace transforms and numerical methods.

Number of Credits: 3

Prerequisites: MATH 112 with a grade of C or better, or MATH 133 with a grade of C or better or MATH 238 with a grade of C or better.

Course-Section and Instructors:

Course-Section	Instructor
Math 322-101	Professor B. Patiak

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

Required Textbook:

Title	*Differential Equations w/ Boundary-Value Problems (Bundle w/ WebAssign)* ***Buy through WebAssign login page***
Author	Dennis G. Zill and Warren S. Wright
Edition	9th
Publisher	Pearson
ISBN #	978-1337604901
Technology	Laptop Computer

University-wide Withdrawal Date: The last day to withdraw with a **W** is **Monday, November 11, 2024**. It will be strictly enforced.

COURSE GOALS

Course Objectives

- Derive solutions of separable and linear first-order differential equations.
- Interpret solutions of differential equation models in mechanics, circuits, &c.
- Derive solutions of linear second order equations or systems that have constant coefficients.
- Apply the Laplace transform to solve forced linear differential equations.

Course Outcomes

- Prepare students for further study in technological disciplines and more advanced mathematics courses.
- Students have an understanding of the importance of differential equations in the sciences and engineering.

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:

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

A	87 - 100	**C**	60 - 70
B+	82 - 86	**D**	50 - 59
B	76 - 82	**F**	0 - 49
C+	71 - 75	**W**	Withdrawn

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.

Midterm Exam I	20%
Midterm Exam II	20%
Quizzes	15%
Homework/Problem Sets	10%
Final Exam	35%

Exams: There will be two exams during the semester and a cumulative final exam during the final exam week:

Midterm Exam I	October 3, 2024 (Week 5)
Midterm Exam II	November 14, 2024 (Week 11)
Final Exam	December 19, 2024 (Tentative)

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 2024 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 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 #	Section #	Subject Topic	Homework (HW) Assignment
Week 1 (9/5)	1.1 2.1	*Definitions and Terminology* *Direction Fields and Autonomous DE IVP*	*1.1: 22, 23* *2.1: 26*
WEEK 2 (9/12)	2.2 2.3	*Variable Separable and* *Linear Differential Equations*	*2.2: 8, 11, 27* *2.3: 3, 17, 23, 28, 35*
WEEK 3 (9/19)	2.6 3.1	*Euler's Method* *Applications of Linear Equations*	*2.6: 7* *9.1: 7* *3.1: 5, 19, 21, 27*
WEEK 4 (9/26)	4.1	*Homogeneous Linear DE* *Review for Exam 1*	*4.1: 15, 18, 27*
WEEK 5 (10/3)	 4.2	*EXAM 1* *Complex Imaginary Roots*	 *4.2: 8 + Worksheet*
WEEK 6 (10/10)	4.2 4.4	*Reduction of order, Repeated Roots* *The Method of Undetermined Coefficients (Part I)*	*4.2: Worksheet* *4.4: 5, 12, 20, 31*
WEEK 7 (10/17)	4.4 4.6	*The Method of Undetermined Coefficients (Part II)* *Variation of Parameters*	*4.4: 5, 12, 20, 31* *4.6: 3, 12, 21*
WEEK 8 (10/24)	5.1	*Spring Mass System*	*5.1: 6, 27, 37*
WEEK 9 (10/31)	8.1 8.2	*Systems of Linear Differential Equations* *Homogeneous Linear Systems -*	*8.1: 2, 5, 7, 8, 18* *8.2: 1, 8, 14, 29, 4*

		Distinct Eigenvalues	
WEEK 10 (11/7)	8.2	*Homogeneous Linear Systems* *Case 2: Complex Eigenvalues* *Review for Exam 2*	*8.2: 1, 8, 14, 29, 43*
WEEK 11 (11/14)		***EXAM 2*** *Definition of Laplace Transform*	
WEEK 12 (11/21)	7.2	*Inverse Transforms* *Solving DE by Laplace*	*7.2: 5, 19, 23, 37, 39*
WEEK 13 (11/26 - Tuesday)	7.2 8.3	*More Laplace* *Boundary-Value Problems*	*8.3 Worksheet*
WEEK 14 (12/5)	9.2	*Runge-Kutta Methods* *Final Exam Review*	
WEEK 15 (12/15-21)		*Final Exam*	*Date to be announced*

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