

## MATH 322: Differential Equations for Applications

### *Spring 2023 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:** 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. Study of methods of undetermined coefficients, variation of parameters, and many series and numerical methods. Includes Laplace transforms, matrix methods, and eigenvalue problems.

**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 322-004	Professor R. Plastock
Math 322-006	Professor R. Plastock
Math 322-102	Professor R. Plastock

**Office Hours for All Math Instructors:** [Spring 2023 Office Hours and Emails](#)

**Required Textbook:**

<b>Title</b>	<i>Differential Equations w/ Boundary-Value Problems (Bundle w/ WebAssign)</i>
<b>Author</b>	Dennis G. Zill and Warren S. Wright
<b>Edition</b>	9th

Publisher	Pearson
ISBN #	978-1337604901
Technology	Laptop Computer

University-wide Withdrawal Date: The last day to withdraw with a W is **Monday, April 3, 2023**. 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.
- Determine the behavior of solutions near critical points of planar systems. Express the solutions of analytic differential equations in power series.

### 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:

Homeworks	15%
Exam I	25%
Exam II	25%
Final Cumulative Exam	35%

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

A	90 - 100	C	70 - 74
B+	85 - 89	D	50 - 69
B	80 - 84	F	0 - 49
C+	75 - 79		

**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.

**Homework:** Textbook assignments are due the class day following the section lecture and will be collected/reviewed at the beginning of class.

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

Exam I	Week 5
Exam II	Week 10
Final Exam	May 5 - May 11, 2023

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: **Spring 2023 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 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/accessibility/>

**Important Dates** (See: **Spring 2023 Academic Calendar, Registrar**)

<b>Date</b>	<b>Day</b>	<b>Event</b>
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January 17, 2023	Tuesday	First Day of Classes
January 23, 2023	Monday	Last Day to Add/Drop Classes
March 13, 2023	Monday	Spring Recess Begins
March 18, 2023	Saturday	Spring Recess Ends
April 3, 2023	Monday	Last Day to Withdraw
April 7, 2023	Friday	Good Friday - No Classes
May 2, 2023	Tuesday	Friday Classes Meet
May 2, 2023	Tuesday	Last Day of Classes
May 3 - May 4, 2023	Wednesday and Thursday	Reading Days
May 5 - May 11, 2023	Friday to Thursday	Final Exam Period

## Course Outline

Week	Section	Topic
1	Review of Calculus	Differentiation, integration
2	1.1, .1.2, 1.3	Introduction to Differential Equations
3	2.1,2,2,2.3,2.4	Separable Equations, Linear Equations
4	2.5,3.1,3.2,3,3	Solutions, Linear and Nonlinear Models Second order linear equations
5	4,1,4,2,4,3	Linear Equations, Homogeneous Equations
	<b>REVIEW</b>	
	<b>MIDTERM EXAM I</b>	
6	4.4,4.5, 4.6	Undetermined Coefficients
7	5.1,5,2,5.3	Linear Models, Spring/Mass Systems, Nonlinear Models
8	6.1, 6.2,6.3	Power Series, Solutions about Ordinary and Singular Points
9	7.1, 7.2, 7.3	Laplace Transforms, Inverse Transforms
10	<b>REVIEW</b>	
	<b>MIDTERM EXAM 2</b>	
11	8.1,8.2	Homogeneous Linear Systems
12	8.3	Nonhomogeneous Linear Systems
13	9.1	Numerical Solutions, Euler Methods
14	9.2	Runga-Kutta Methods
15	Review	REVIEW FOR FINAL EXAM

*Updated by Professor R. Plastock - 1/4/2023  
Department of Mathematical Sciences Course Syllabus, Spring 2023*