



THE COLLEGE OF SCIENCE
AND LIBERAL ARTS

THE DEPARTMENT OF MATHEMATICAL SCIENCES

MATH 322: Differential Equations for Applications

Summer 2021 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. 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 C or better.

Course-Section and Instructors

Course-Section	Instructor
Math 322-140	Professor B. Patiak

Office Hours for All Math Instructors: [Summer 2021 Office Hours and Emails](#)

Required Textbook:

Title	<i>Differential Equations with Boundary-Value Problems, 9th + Enhanced WebAssign</i>
Author	Dennis G. Zill and Warren S. Wright
Edition	9th
Publisher	Pearson
ISBN #	978-1337652483 (bound) 978-1337604901 (looseleaf)

Withdrawal Date: Please see the [Summer 2021 Academic Calendar](#) for the last day to withdraw based on the summer session you are registered for.

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:

Midterm Exam I	20%
Midterm Exam II	20%
Quizzes	15%
Homework/Problem Sets	15%
Final Exam	30%

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

A	90 - 100	C	70 - 74
B+	85 - 89	D	55 - 69
B	80 - 84	F	0 - 54
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. Students are expected to attend class. Each class is a learning experience that cannot be replicated through simply "getting the notes." To pass this class with a C or better your overall average must be at least 65% AND you need to earn at least 60% on one of the exams.

Classroom: Classes will be delivered in converged/hybrid manner and synchronous during the scheduled meeting. The class will meet twice a week. The instructor will provide the lecture worksheet in advance and will be uploaded in Canvas. It is expected that the students will partake in the discussion through chat, microphone or by sharing screen.

Homework Policy: Homework is an expectation of the course. All homework for the summer session is listed, by section, below. All homework will be collected and will be submitted by uploading them to canvas.

Quizzes: All assessments will be monitored through the lockdown browser and Respondus monitor. Additional steps will be taken to upload work for partial credit. There would be a quiz every meeting and will be given at

the beginning of each class.

Exams: There will be two midterm exams held during the semester and one comprehensive common final exam. Exams are held on the following days:

Midterm Exam I	June 9, 2021
Midterm Exam II	June 23, 2021
Final Exam	July 19, 2021

Makeup Exam Policy: To properly report your absence from a midterm or final exam, please review and follow the required steps under the DMS Examination Policy found here:

- http://math.njit.edu/students/policies_exam.php

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, Room G11 (See: [Summer 2021 Hours](#))

Accommodation of Disabilities: Disability Support Services (DSS) 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 Chantonette Lyles, Associate Director of Disability Support Services at [973-596-5417](tel:973-596-5417) or via email at lyles@njit.edu. The office is located in Fenster Hall Room 260. For further information regarding self identification, the submission of medical documentation and additional support services provided please visit the Disability Support Services (DSS) website at:

- <https://www.njit.edu/studentssuccess/accessibility/>

Important Dates (See: [Summer 2021 Academic Calendar](#), Registrar)

Date	Event
May 24, 2021	First Day of Classes for FIRST, MIDDLE, AND FULL SUMMER SESSIONS
May 26, 2021	Last Day to Add/Drop Classes for FIRST SUMMER SESSION
May 28, 2021	Last Day to Add/Drop Classes for MIDDLE SUMMER SESSION
May 31, 2021	Last Day to Add/Drop Classes for FULL SUMMER SESSION
May 31, 2021	University Closed for Memorial Day
June 28, 2021	Last Day of FIRST SUMMER SESSION
July 4, 2021	University Closed for Independence Day
July 5, 2021	University Closed for Independence Day
July 7, 2021	First Day of FTF SUMMER SESSION
July 19, 2021	Last Day of MIDDLE SUMMER SESSION
August 2, 2021	Last Day of FULL SUMMER SESSION
August 16, 2021	Last Day of FTF SUMMER SESSION

Course Outline

Class	Section	Title	Homework
1 (5/24, 26)	1.1 2.1 2.2	Definitions and Terminology Direction Fields and Autonomous DE IVP and Variable Separable	1.1: 22, 23 2.1: 26 2.2: 8, 11, 27
	2.3 2.6	Linear Differential Equations Euler's Method	2.3: 3, 17, 23, 28, 35 2.6: 7 9.1: 7
2 (5/31, 6/2)	3.1 4.1	Applications of Linear Equations Homogeneous Linear DE	3.1: 5, 19, 21, 27 4.1: 15, 18, 27
	4.2	Redutction of order and Repeated Roots <i>Review of Exam 1</i>	4.2: 8 + Worksheet
3 (6/7, 9)	4.3	EXAM 1 Complex Imaginary Roots	
	4.4 4.6	The Method of Undetermined Coefficients and Variation of Parameters	4.4: 5, 12, 20, 31 4.6: 3, 12, 21
4 (6/14, 16)	5.1	Spring Mass System	5.1: 6, 27, 37
	7.1	Definition of Laplace Transform <i>Review of Exam 2</i>	7.1: 11, 20, 29, 37
5 (6/21, 23)	7.2	EXAM 2 Inverse Transforms, Solving DE by Laplace	7.2: 5, 19, 23, 37, 39
	7.3 8.1	Unit Step Fuctions Systems of Linear Differential Equations	7.3: 9, 16, 26
7 (7/12, 14)	8.2	Homogeneous Linear Systems	8.1: 2, 5, 7, 8, 18 8.2: 1, 8, 14, 29, 43
	8.2	Complex Eigenvalues <i>Final Exam Review</i>	
8 (7/19)		FINAL EXAM	N/A

*Updated by Professor B. Patiak - 5/11/2021
Department of Mathematical Sciences Course Syllabus, Summer 2021*
