



THE COLLEGE OF SCIENCE
AND LIBERAL ARTS

THE DEPARTMENT OF MATHEMATICAL SCIENCES

MATH 322: Differential Equations for Applications

Summer 2020 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 322-450	Professor I. Cohanoschi

Office Hours for All Math Instructors: [Summer 2020 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)
Notes	Laptop Computer

Withdrawal Date: Please see the [Summer 2020 Academic Calendar](#) for the last day to withdraw based on the summer session you are registered for.

COURSE STRUCTURE

This course is conducted entirely online, which means you do not have to be on campus to complete any portion of it. You will participate in the course using NJIT's learning management system called CANVAS (<https://canvas.njit.edu>).

COMPUTER REQUIREMENTS

You will need to have an up-to-date browser, operating system and some additional software on your computer to take this class.

COURSE COMMUNICATIONS

ANNOUNCEMENTS: Announcements will be posted in CANVAS on a regular basis. They will appear on your CANVAS dashboard when you log in and/or will be sent to you directly through your preferred method of notification from CANVAS. Please make certain to check them regularly, as they will contain any important information about upcoming projects or class concerns.

DISCUSSION FORUMS: Discussion Forums are a way for you to engage with each other about the course content. Each lesson module will have a question that links to a forum.

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:

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

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

A	90 - 100	C	70 - 74
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B+	85 - 89	D	60 - 69
B	80 - 84	F	0 - 59
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 Policy: Homework is an expectation of the course. All homework assignments are online using WebAssign. The online assignments can be completed at www.webassign.net. You need to have a student access code. Access codes are included with new book that is bundled with WebAssign; codes can be purchased separately from the bookstore or online. WebAssign gives you free access for two weeks after the start of class. In addition, on the first day of class your course instructor will give an additional code "Class key" needed to enroll to WebAssign.

Quiz Policy: Quizzes will be given approximately once a week throughout the semester. They will be based on the lecture, homework and the discussions. Quizzes will be assigned through Canvas and students will be expected to complete the quiz online. There are no make-up quizzes; average will be calculated after dropping the lowest two scores.

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 8, 2020
Midterm Exam II	June 24, 2020
Final Exam	July 13, 2020

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 2020 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 2020 Academic Calendar, Registrar](#))

Date	Event
May 18, 2020	First Day of Classes
May 18, 2020	Last Day to Add/Drop Classes for FIRST, MIDDLE, AND FULL

May 25, 2020	University Closed for Memorial Day
June 22, 2020	Last Day of FIRST SUMMER SESSION
June 29, 2020	First Day of FTF AND SECOND SUMMER SESSION
July 4, 2020	University Closed for Independence Day
July 13, 2020	Last Day of MIDDLE SUMMER SESSION
August 3, 2020	Last Day of FULL AND SECOND SUMMER SESSIONS
August 12, 2020	Last Day of FTF SUMMER SESSIONS

Course Outline

Class	Section	Title	Homework
1 (5/18)	1.1-1.2; 2.1-2.2	Introduction to Differential Equations, Solving Autonomous and Separable Equations	1.1: 22, 23 1.2: 4, 8, 12 2.1: 26 2.2: 8, 11, 27
2 (5/20)	2.3-2.4	First-Order Linear Differential Equations, Exact Equations	2.3: 3, 17, 23, 28, 35 2.4: 5, 10, 22, 27, 33
3 (5/27)	2.5-2.6; 9.1	Bernoulli Equations, Euler's Methods	2.5: 18, 22, 25 2.6: 7 9.1: 7
4 (6/1)	9.2; 3.1	The Fourth-Order Runge Kutta Method and Applications of First-Order Linear Differential Equations	9.2: 9 3.1: 5, 19, 21, 27
5 (6/3)	3.2; 4.1- 4.2	Applications of First-Order Nonlinear Differential Equations, Introduction to Higher-Order Equations	3.2: 2, 11 4.1: 15, 18, 27 4.2: 8
6 (6/8)	4.3	6:00-7:20: EXAM #1	4.3: 12, 22, 28
		7:40-9:00: Homogeneous Equations with Constant Coefficients	32, 40
7 (6/10)	4.4; 4.6	The Method of Undetermined Coefficients and Variation of Parameters	4.4: 5, 12, 20, 31 4.6: 3, 12, 21
8 (6/15)	5.1-5.2	Linear Initial-Value Problems and Linear Boundary-Value Problems	5.1: 6, 27, 37 5.2: 10, 15
9 (6/17)	6.1-6.2	A Review of Power Series and Series Solutions About Ordinary Points	6.1: 5, 12, 19 6.2: 6, 7
10 (6/22)	6.3; 7.1	Series Solutions About Singular Points and The Laplace Transform	6.3: 5, 16 7.1: 11, 20, 29, 37
11 (6/24)	7.2	6:00-7:20: EXAM #2	7.2: 5, 19, 23, 37, 39
		7:40-9:00: The Inverse Laplace Transform	
12 (6/29)	7.3-7.4; App B	Properties of the Laplace Transform and a Crash-Course in Matrix Algebra	7.3: 9, 16, 26 7.4: 6, 10, 19,

			26, 36 App. B: 31, 50, 54, 56
13 (7/1)	8.1-8.2	Homogeneous Systems of Linear Differential Equations	8.1: 2, 5, 7, 8, 18 8.2: 1, 8, 14, 29, 43
14 (7/6)	8.3	Non-Homogeneous Systems of Linear Differential Equations	8.3: 3, 7
15 (7/8)		REVIEW FOR FINAL EXAM	
15 (7/16)	N/A	FINAL EXAM	N/A

*Updated by Professor I. Cohanoschi - 4/29/2020
Department of Mathematical Sciences Course Syllabus, Summer 2020*
