MATH 322: Differential Equations for Applications
Summer 2019 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 322-141	Professor M. Potocki-Dul

Office Hours for All Math Instructors: Summer 2019 Office Hours and Emails

Required Textbook:

Title	*Differential Equations with Boundary-Value Problems, 9th + Enhanced WebAssign*
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 2019 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 coefficents.
- 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/Quizzes	15%
Midterm Exam I	25%
Midterm Exam II	25%
Final Exam	35%

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

A	90 - 100	C	70 - 74
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.

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 12, 2019
Midterm Exam II	July 1, 2019
Final Exam	July 15, 2019

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 (Summer Hours: TBA)

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 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:

- http://www5.njit.edu/studentsuccess/disability-support-services/

Important Dates (See: Summer 2019 Academic Calendar, Registrar)

Date	Event
May 20, 2019	First Day of Classes
May 21, 2019	Last Day to Add/Drop Classes for **FIRST, MIDDLE, AND FULL**
May 27, 2019	University Closed for Memorial Day
June 24, 2019	Last Day of **FIRST SUMMER SESSION**
July 1, 2019	First Day of Second Summer Session
July 4-5, 2019	University Closed for Independence Day
July 15, 2019	Last Day of **MIDDLE SUMMER SESSION**
August 6, 2019	Last Day of **FULL AND SECOND SUMMER SESSIONS**

Course Outline

Class	Section	Title	Homework
1 (5/21)	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 (5/23)	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 (5/30)	2.5-2.6; 9.1	Bernoulli Equations, Euler's Methods	2.5: 18, 22, 25 2.6: 7 9.1: 7
4 (6/4)	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 (6/6)	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 (6/11)	4.3	**6:00-7:20: EXAM #1**	4.3: 12, 22, 28, 32, 40

		7:40-9:00: Homogeneous Equations with Constant Coefficients	
7 (6/13)	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 (6/18)	5.1-5.2	Linear Initial-Value Problems and Linear Boundary-Value Problems	5.1: 6, 27, 37 5.2: 10, 15
9 (6/20)	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 (6/25)	6.3; 7.1	Series Solutions About Singular Points and The Laplace Transform	6.3: 5, 16 7.1: 11, 20, 29, 37
11 (6/27)	7.2	**6:00-7:20: EXAM #2**	7.2: 5, 19, 23, 37, 39
		7:40-9:00: The Inverse Laplace Transform	
12 (7/2)	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 (7/9)	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 (7/11)	8.3	Non-Homogeneous Systems of Linear Differential Equations	8.3: 3, 7
		REVIEW FOR FINAL EXAM	
15 (7/16)	N/A	**FINAL EXAM**	N/A