Spring 2018 Course Syllabus: Math 331-004

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. Unless explicit instructions for group work are given, all assignments should represent your individual effort. There must not be any forms of plagiarism, 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. Any indications of violation of the Academic Integrity Code will be forwarded to the Dean of Students.

Course Title:	**Introduction to Partial Differential Equations**
Textbook:	Applied Partial Differential Equations by Richard Haberman (5th Ed) *Pearson Prentice-Hall*, ISBN: **978-0321797056**
Prerequisites:	(Math 211 or Math 213) and Math 222, with a grade of C or higher
Website:	http://web.njit.edu/~matveev/Courses/M331_S18/

Course Outline		
Lecture	**Sections**	**Topic**
1 (1-16)	3.1-3.3	Intro: visualizing scalar fields (Calculus III), linearity, Fourier series
2 (1-18)	3.4-3.6	Fourier series
3 (1-23)	3.4-3.6	Fourier series continued: term-by-term operations
4 (1-25)	1.2-1.3	Heat equation: 1D derivation & boundary conditions
5 (1-30)	1.3-1.4	Heat equation: equilibrium temperature distribution
6 (2-1)	1.4-1.5	Heat equation: equilibrium temperature distribution; higher dimensions
7 (2-6)	2.3	Method of separation of variables: boundary value problems
8 (2-8)	2.4.1-2.4.2	Solving heat equation in 1D rod: insulated ends
9 (2-13)	2.4.2-2.4.3	Solving heat equation in 1D rod: circular ring
10 (2-15)	2.5.1	Laplace's equation inside a rectangle
11 (2-20)	2.5.2, 2.5.4	Laplace's equation inside a disk; qualitative properties
12 (2-22)	4.1-4.2, 4.4	Wave equation: 1D derivation and vibrating string with fixed ends
13 (2-27)	4.3	Wave equation: boundary conditions and vibrating string continued
14 (3-1)	4.5	Wave equation: vibrating membrane; dissipation
15 (3-6)	**Exam Review**	
16 (3-8)	**Midterm Examination**	
17 (3-20)	5.1-5.4	Sturm-Liouville eigenvalue problems: properties; proof of orthogonality
18 (3-22)	5.5, 5.6	Sturm-Liouville problems: self-adjointness; Rayleigh quotient
19 (3-27)	5.6	Rayleigh Quotient test function examples
20 (3-29)	5.8	More Rayleigh Quotient examples; Robin boundary conditions
April 2	**Last Day to Withdraw**	
21 (4-3)	6.1-6.2	Finite difference numerical methods
22 (4-5)	6.2-6.3.2	Euler finite difference method for heat equation; von Neumann stability
23 (4-10)	7.1-7.2	PDE's in 2+1 dimensions: vibration of a rectangular membrane
24 (4-12)	7.7, 7.8	Bessel equation and Bessel functions
25 (4-17)	7.7	Vibration of a circular membrane
26 (4-19)	10.1-10.3	Heat equation on an infinite line; Fourier Transform derivation
27 (4-24)	10.4, 10.6	Fourier Transform continued
28 (4-26)	**Final Exam Review**	

Grading Policy

Assignment Weighting	
Homework	15 %
Quiz	15 %
Midterm Exam	30 %
Final Exam	40 %

Tentative Grading Scale	
A	89 – 100
B+	82 – 86
B	75 – 80
C+	68 – 74
C	61 – 67
D	53 – 60
F	0 – 52

Course Policies

Email: it is important that you regularly check your NJIT email account for class assignments and announcements from your instructor. Rutgers students should email the instructor their preferred email address at the start of the semester.

Homework and Quizzes: Homework problem sets will be emailed by the instructor each week, and may include problems requiring basic MATLAB coding. Homework is in general due each Wednesday; late work is not accepted. Short quizzes will also be given about once per week, on a pre-announced topic.

Attendance: attendance in this class is mandatory.