# Fall 2016 Course Syllabus:  Math 331-002

**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.

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| 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_F16/ |

| Course Outline | | |
|---|---|---|
| **Lecture** | **Sections** | **Topic** |
| 1 (1-19) | 3.1-3.3 | Intro to PDEs; Review: ODEs, Calculus III, Fourier Series |
| 2 (1-23) | 3.4-3.6 | Fourier Series and term-by-term operations |
| 3 (1-26) | 1.2-1.3 | Heat Equation: 1D Derivation & Boundary Conditions |
| 4 (1-30) | 1.3-1.4 | Heat Equation: Equilibrium temperature Distribution |
| 5 (2-2) | 1.4-1.5 | Heat Equation: Equilibrium temperature Distribution; Higher Dimensions |
| 6 (2-6) | 2.3 | Method of Separation of Variables & Solving Heat Equation in 1D Rod |
| 7 (2-9) | 2.4.1-2.4.2 | Solving Heat Equation in 1D Rod: Insulated Ends |
| 8 (2-13) | 2.4.3 | Heat Equation in a Circular Ring |
| 9 (2-16) | 2.5.1 | Laplace's Equation Inside a Rectangle |
| 10 (2-20) | 2.5.2, 2.5.4 | Laplace's Equation Inside a Disk; Qualitative properties |
| 11 (2-23) | 4.1-4.2, 4.4 | Wave Equation: 1D Derivation and Vibrating String with Fixed Ends |
| 12 (2-27) | 4.3 | Wave Equation: Boundary Conditions and Vibrating String Continued |
| 13 (3-2) | 4.5, 5.1 | Wave Equation: Vibrating Membrane and Introduction to Chapter 5 |
| **14 (3-6)** | **Exam Review** | |
| **15 (3-8 or 9)** | **Midterm Examination** | |
| **March 13-17** | **Spring Break** | |
| 16 (3-20) | 5.2-5.4 | Sturm-Liouville Eigenvalue Problems |
| 17 (3-23) | 5.5 | Sturm-Liouville Problems: Self-Adjointness and proofs of properties |
| **3-27** | **Last Day to Withdraw** | |
| 18 (3-27) | 5.6, 5.8 | Rayleigh Quotient and Robin Boundary Conditions |
| 19 (3-30) | 5.6, 6.1 | More Rayleigh Quotient examples; Chapter 6: Finite Differences |
| 20 (4-3) | 6.2-6.3.2 | Finite Difference Numerical Methods for PDEs |
| 21 (4-6) | 6.3.4, 7.1-7.2 | Finite differences: stability analysis; PDE's in 2+1 dimensions |
| 22 (4-10) | 7.1-7.3 | PDE's in 2+1 dimensions: vibration of a rectangular membrane |
| 23 (4-13) | 7.7 | Vibration of a Circular Membrane |
| 24 (4-17) | 7.8 | More on Bessel Functions |
| 25 (4-20) | 10.1-10.3 | Heat Equation on the Line; Nonhomogeneous Problems |
| 26 (4-24) | 10.4-10.5 | Eigenfunction Expansion; Heat Equation on a Half-Line |
| 27 (4-27) | 10.6 | Fourier Transform: Applications |
| **28 (5-1)** | **Final Exam Review** | |

# Grading Policy

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

| Tentative Grading Scale | |
|---|---|
| A | 87 -- 100 |
| B+ | 81 – 86 |
| B | 75 – 80 |
| C+ | 68 – 74 |
| C | 62 – 67 |
| D | 55 – 61 |
| F | 0 – 54 |

# 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.