

NORTH CAROLINA STATE UNIVERSITY
DEPARTMENT OF MATHEMATICS

MA401: Applied Differential Equations II

Semester: SS-1, 2019

Course: MA401.001 (L.K. Norris)

Office hours: TBA

TEXTBOOK: "Introduction to Applied Partial Differential Equations" by John M. Davis

GRADING: [plus-minus grading](#)

- (0) Test #0: 10% - Monday, May 20. Review Material in section 1.4
- (1) Test #1: 20% - Tuesday, May 28. Chapters 1 and 2
- (2) Test #2: 20% - Wednesday, June 12. Chapters 3 and 4
- (3) Homework: 20% - Composed of take-home problems given throughout the semester. A good portion of the work will require you to use Maple.
- (4) Final Exam: 30% - Thursday, June 20 from 8 - 11 a.m. Chapters 1-6

COURSE CALENDAR

		May 15	May 16	May 17
May 20	May 21	May 22	May 23	May 24
Test #0 30 minutes				
May 27 Holiday - no classes.	May 28 Test #1	May 29	May 30	May 31
June 3	June 4	June 5	June 6	June 7
June 10	June 11	June 12 Test #2	June 13	June 14
June 17	June 18 Last day of classes	June 19 Study day	June 20 Final Exam 8-11 am	

Semester Schedule

Chapter	Topics
1.....	Introduction to PDEs
1.1	ODEs vs PDEs
1.2	How PDEs Are Born: Conservation Laws, Fluids and Waves
1.3	Boundary Conditions in One Space Dimension
1.4	ODE Solution Methods
	Test #0
2.....	Fourier's Method: Separation of Variables
2.1	Linear Algebra Concepts
2.2	The General Solution via Eigenfunctions (the heat & wave equations)
2.3	The Coefficients via Orthogonality
2.4	Consequences of Orthogonality
2.5	Robin Boundary Conditions
	Test #1
3.....	Fourier Series Theory
3.1	Fourier Sine, Fourier Cosine, and Full Fourier Series
3.3	Error Analysis and Modes of Convergence
3.4	Convergence Theorems
3.5	Basic L^2 Theory
4.....	General Orthogonal Series Expansions
4.1	Regular and Periodic Sturm-Liouville Theory
4.2	Singular Sturm-Liouville Theory
4.3	Orthogonal Expansions: Special Features
	Test #2
5.....	PDEs in Higher Dimensions
5.5	Laplace's Equation in 2D
5.6	The 2D Wave and Heat Equations
6.....	PDEs in Other Coordinate Systems
6.1	Laplace's Equation in Polar Coordinates
6.3	The Wave and Heat Equations in Polar Coordinates
6.4	Laplace's Equation in Cylindrical Coordinates
6.5	Laplace's Equation in Spherical Coordinates
	Final Exam