Mathematics 30650-01, Differential Equations

FALL Semester, 2015

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LECTURES: 8:20-9:10 am MWF, DBTL 131

TEXTBOOK: Elementary Differential Equations and Boundary Value Problems by Boyce and di Prima. 10th Edition (John Wiley and Sons Inc.)
(ISBN: 978-0-470-43831-0)

Prerequisite: Math 20580

HOMEWORK: The homework of each week will be due on Friday. At the end of the semester the homework with the lowest score will be dropped. No late homework will be accepted.

EXAMS:
Exam I: October 15 Thursday 8:00-9:15 am, Room 155 DeBartolo
Exam II: November 17 Tuesday, 8:00-9:15 am, Room 155 DeBartolo
Final Exam: December 16, Wednesday, 1:45-3:45 pm

GRADING: Your course grade will be computed as follows:
Each Exam: 20%
Homework: 20%
Final Exam: 40%

Office Hours: There will be regular office hours on every Wednesday, 1:30-3:30 pm at my office or by appointments.

Absence from Exams: A student who is absent from an examination without an official excuse shall receive a grade of zero for that examination. A student who is officially excused will not be penalized. If you miss a test for any reason, call the instructor or the Mathematics Department as soon as possible.

Honor Code: The exams are under the honor code. The honor code does not apply to homework. So you may discuss the homework with other classmates but do not copy each other.
MATH 30650 SYLLABUS

CHAPTER 4 Higher Order Linear Equations (5 Lectures with review of Chapter 3)
4.1 General Theory of nth Order Linear Equations
4.2 Homogeneous Equations with constant Coefficients
4.3 (3.5) The Method of Undetermined Coefficients
4.4 (3.6) The Method of Variation of Parameters

CHAPTER 6 The Laplace Transform (7 Lectures)
6.1 Definition of the Laplace Transform
6.2 Solution of Initial Value Problems
6.3 Step Functions
6.4 Differential Equations with Discontinuous Forcing Functions
6.5 Impulse Functions
6.6 The Convolution Integral

CHAPTER 7 Systems of First Order Linear Equations (10 Lectures, 1 Review)
7.1 Introduction
7.2 Review of Matrices
7.3 Systems of Linear Algebraic Equations
7.4 Basic Theory of Systems of First Order Linear Equations
7.5 Homogeneous Linear Systems with Constant Coefficients
7.6 complex Eigenvalues
7.7 Fundamental Matrices
7.8 Repeated Eigenvalues
7.9 Nonhomogeneous Linear Systems

CHAPTER 8 Numerical Methods (1 Lecture)
8.1 The Euler or Tangent Line Method

CHAPTER 9 Nonlinear Differential Equations and Stability (9 Lectures, 1 Review)
9.1 The Phase Plane: Linear systems
9.2 Autonomous Systems and Stability
9.3 Almost Linear systems
9.5 Predator-Prey Equations
9.6 Liapunov’s Second Method

CHAPTER 10 Partial Differential Equations and Fourier Series (6 Lectures, 1 Review)
10.1 Two-Point Boundary Value Problems
10.2 Fourier Series
10.3 The Fourier Convergence Theorem
10.4 Even and Odd Functions
10.5 Separation of Variables, Heat Conduction Problems
10.6 Other Heat Conduction Problems (if time permits)
10.7 The Wave Equation: Vibrations of an Elastic String
Math 30650, Fall 2015 Homework Problems

Homework #1 (Due Friday, September 4)
3.5: 2, 3, 8, 11, 15, 19
3.6: 5, 6, 8, 12
4.1: 1, 2, 6, 7, 8, 9, 11

Homework #2 (Due Friday, September 11)
4.2: 1, 3, 7, 8, 11, 12, 14, 15, 18, 20, 22, 23, 29
4.3: 1, 7, 13, 14, 15, 18
4.4: 1, 2, 4

Homework #3 (Due Friday, September 18)
6.1: 1, 4, 5, 7, 12, 13, 15, 22, 23, 26
6.2: 1, 2, 4, 5, 8, 9, 16, 20, 23, 24

Homework #4 (Due Friday, September 25)
6.3: 1, 3, 4, 7, 10, 13, 14, 15, 17, 19, 20, 21
6.4: 1, 2, 4, 7, 9, 10

Homework #5 (Due Friday, October 2)
6.5: 1, 2, 6, 7, 8, 11, 12
6.6: 4, 5, 6, 7, 8, 9, 10, 11, 13

CHAPTER 7 Systems of First Order Linear Equations

Homework #6 (Due Friday, October 9)
7.1: 1, 2, 5, 7, 8, 11
7.2: 1, 4, 10, 11, 13, 15
7.3: 1, 2, 4, 5, 7, 8, 11, 13, 14, 15, 17, 18, 23

Exam I Oct. 15, Thursday 8:00-9:15 am, Room 155 DeBartolo

Homework #7 (Due Friday, October 30)
7.4: 4, 5
7.5: 1, 5, 6, 7, 9, 11, 12, 15
7.6: 1, 2, 3, 5, 6, 7, 9

Homework #8 (Due Friday, November 6)
7.7: 1, 4, 5, 6, 11
7.8: 1, 2, 5, 6, 7, 10

Homework #9 (Due Friday, November 13)
7.9: 1, 4, 7, 8
9.1: 1, 2, 4, 5, 6, 11, 13, 14

Exam II Nov. 17, Tuesday, 8:00-9:15 am
Homework #10 (Due Friday, November 20)
  9.2: 2, 3, 5, 6, 9, 10, 12, 13, 17, 18, 21, 23

Homework #11 (Due Monday, November 30)
  9.3: 1, 3, 5, 7, 10, 13, 14
  9.5: 1, 3

Homework #12 (Due Friday, December 4)
  10.1: 1, 2, 3, 5, 8, 14, 16, 17
  10.2: 1, 2, 4, 13, 14, 16

Homework #13
  10.3: 1, 2, 3, 5
  10.4: 1, 4, 5, 7, 9, 15, 17, 18, 21, 22
  10.5: 1, 2, 3, 6, 7, 8, 9, 10, 12