

**Mathematics 30650-02, Differential Equations**

**Spring Semester, 2019**

**MWF 9:25-10:15 am, DBTL 217**

**Instructor:** Mei-Chi Shaw

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**Course Website:**

<http://sites.nd.edu/meichi/class-information/>

**TEXTBOOK:** Elementary Differential Equations and Boundary Value Problems by Boyce, di Prima and Meade, 11th Edition (John Wiley and Sons Inc.)  
(ISBN: 978-1-119-37575-3)

**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: Feb. 14, Thursday, 8:00-9:15 am DBTL 155**

**Exam II: April 11, Thursday 8:00-9:15 am DBTL 155**

**Final Exam:** Wednesday, May 8 1:45-3:45 pm

**GRADING:** Your course grade will be computed as follows:

Each Exam: 20%

Homework: 20%

Final Exam: 40%

**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.

**Office Hours:** There will be regular office hours every Wednesday, 1:00-3:00 pm (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.

**MATH 30650 SYLLABUS****CHAPTER 4** Higher Order Linear Equations (5 Lectures with review of Chapter 3)

- 4.1 General Theory of  $n$ th 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, 1 Review)

- 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)

- 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 (8 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

**CHAPTER 10** Partial Differential Equations and Fourier Series (7 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