

Math 224 Fall 09

Elementary Differential Equations

Instructor: Pilwon Kim Office: Yost 227 E-mail: pilwon.kim@case.edu

Course Website: TBA

Office Hour: MF 1:00–1:50 PM or other times by appointment

Text: 1. P. Blanchard, R.L.Devaney and G.R.Hall, "Differential Equations" 3rd ed.

2. P. Dawkins, "Differential Equations" online lecture note

The second text in both pdf and html versions is available at

<http://tutorial.math.lamar.edu/Classes/DE/DE.aspx> by courtesy of Paul Dawkins.

Grading Policy: Grade will be based on curve. Total 600 points = Homework(100 points) + Three Midterms(100 points each) + Final(200 points). The final exam is comprehensive.

Calculator policy: Any calculator with symbolic or graphing manipulation is not allowed. Only simple calculator can be used during the exam.

Homework: Homework problems will be posted on the course website.

Topics & Schedule

Note: "B" denotes P.Blanchard's book and "D" denotes P.Dawkin's.

0. Introduction (8/24 B:1.1, D:p.2)

1. First Order Differential Equations

Integrating Factors (8/26 B:1.9, D:p.21)

Separation (8/28 B:1.2, D:p.34)

Exact Equations (8/31 D:p.45)

Slop Fields and Stability (9/2 B:1.3, D:p.8, p.90)

Existence and Uniqueness of Solutions (9/4 B:1.6, D:p.72)

2. Second Order Linear Differential Equations

Basic Concepts (9/9 D:p.104, p.109)

Fundamental Sets of Solutions (9/11 D:p.126)

Complex Roots (9/14 D:p.113)

Repeated Roots (9/16 D:p.118)

Review for Midterm #1 (9/18)

Midterm #1 (9/21)

Nonhomogeneous Equations (9/23 D:p.137, p.139)

Variation of Parameters (9/25 D:p.156)

Mechanical Vibrations (1) (9/28 B:4.1, 4.2, D:p.162)

- Mechanical Vibrations (2) (9/30 B:4.3, 4.4, D:p.162)
- Appendix: Substitutions (10/2 B:Appendices A, D:p.63)
3. Systems of Differential Equations
- Basic Concepts (10/5 B:2.1, 3.1, D:p.269)
 - Phase Planes (10/7 B:2.2, 3.3, D:p.275)
 - Review of Linear Algebra (10/9 D:p.249, p.259)
 - Real Eigenvalues (10/12 D:p.280)
 - Complex Eigenvalues (10/14 B:3.4, D:p.290)
 - Repeated Eigenvalues (10/16 B:3.5, D:p.296)
 - Nonhomogeneous Systems (10/21 D:p.303)
- Review for Midterm #2 (10/23)
- Midterm #2 (10/26)
- Linearization (10/28 B:5.1)
 - Nullclines (10/30 B:5.2)
 - Hamiltonian Systems (11/2 B:5.3)
 - Dissipative Systems (11/4 B:5.4)
 - Chaos (11/6 B:5.5, 5.6)
4. Laplace Transform
- Basic Concepts (11/9 B:6.1)
 - Laplace Transform of Differential Equations (11/11 B:6.1, 6.3)
 - Step Functions (11/13 B:6.2)
 - Impulse Functions (11/16 B:6.4)
 - Convolutions (11/18 B:6.5)
- Review for Midterm #3 (11/20)
- Midterm #3 (11/23)
5. Series Methods
- Review of Power Series (11/25 D:p.319, p.327)
 - Series Solutions (1) (11/30 D:p.330)
 - Series Solutions (2) (12/2 D:p.330)
- Review for Final (12/4)
- Final (12/8, 4-7pm, Location:TBA)