Math 216 Differential Equations

Fall 2009 Syllabus (For sections: 10, 20, 50)

Some of the material covered, and some of the dates may be changed at your instructor's discretion. You will be informed if this is the case. Key: blue text indicates due dates for written assignments to be turned in to your recitation instructor, magenta text indicates closing times for the web homework assignments, and red text indicates scheduled exams. Prelab assignments can be found in the lab manuals that may be downloaded from the course website. The review of complex numbers text supplement may also be downloaded from the course website.

Week 1:

Wednesday, September 9. Lecture.

Mathematical modeling with differential equations, solutions given by integrals, and slope fields. Edwards and Penney sections 1.1, 1.2, and 1.3.

Thursday, September 10. Recitation.

Introductory meeting with recitation instructor. Math 216 orientation.

Friday, September 11. Lecture.

Separable and linear first-order differential equations. Edwards and Penney sections 1.4 and 1.5.

Week 2:

Monday, September 14. Lecture.

Differential equations for population modeling. Edwards and Penney section 2.1.

Wednesday, September 16. Lecture.

Equilibria and their stability. Edwards and Penney section 2.2.

Thursday, September 17. Lab.

Lab 1.

Friday, September 18. Lecture.

Differential equations for kinematics of velocity and acceleration. Edwards and Penney section 2.3. Due to recitation instructor by 5 PM: Homework Set 1. Web Homework Sets 0 and 1 close at 10 PM.

Week 3:

Monday, September 21. Lecture.

Review.

Wednesday, September 23. Lecture.

Numerical methods for approximating solutions of initial-value problems for differential equations. Edwards and Penney sections 2.4, 2.5, and 2.6.

Thursday, September 24. Recitation.

Review.

Friday, September 25. Lecture.

Review. Due to recitation instructor by 5 PM: Homework Set 2 and Writeup of Lab 1. Web Homework Set 2 closes at 10 PM.

Week 4:

Monday, September 28. Lecture.

Second-order linear differential equations. Edwards and Penney section 3.1.

Wednesday, September 30. Lecture.

Complex numbers.

Thursday, October 1. Lab.

Lab 2. Due at beginning of lab: Prelab assignment for Lab 2.

Friday, October 2. Lecture.

General facts about linear equations. Second-order linear homogeneous equations with constant coefficients. Edwards and Penney sections 3.2 and 3.3. Due to recitation instructor by 5 PM: Homework Set 3. Web Homework Set 3 closes at 10 PM.

Week 5:

Monday, October 5. Lecture.

Edwards and Penney section 3.3, continued.

Wednesday, October 7. Lecture.

Differential equations governing mechanical vibrations. Edwards and Penney section 3.4.

Thursday, October 8. Recitation.

Review.

Friday, October 9. Lecture.

Review.

Week 6:

Monday, October 12. Lecture.

Review. Test 1, 6–8 PM.

Wednesday, October 14. Lecture.

Nonhomogeneous terms, the method of undetermined coefficients, and the method of variation of parameters. Edwards and Penney section 3.5.

Thursday, October 15. Lab.

Lab 3. Due at beginning of lab: Prelab assignment for Lab 3.

Friday, October 16. Lecture.

Edwards and Penney section 3.5, continued. Due to recitation instructor by 5 PM: Homework Set 4 and Writeup of Lab 2. Web Homework Set 4 closes at 10 PM.

Week 7: (Fall Study Break)

Wednesday, October 21. Lecture.

Forced oscillations and resonance. Edwards and Penney section 3.6.

Thursday, October 22. Recitation.

Review.

Friday, October 23. Lecture.

First-order systems of differential equations and the method of elimination. Edwards and Penney sections 4.1 and 4.2. Due to recitation instructor by 5 PM: Homework Set 5.Web Homework Set 5 closes at 10 PM.

Week 8:

Monday, October 26. Lecture.

Numerical methods for systems of first-order equations. Edwards and Penney section 4.3. Review.

Wednesday, October 28. Lecture.

Linear algebra, eigenvalues and eigenvectors. Edwards and Penney section 5.1.

Thursday, October 29. Recitation.

Review.

Friday, October 30. Lecture.

Edwards and Penney section 5.1, continued. Due to recitation instructor by 5 PM: Homework Set 6 and Writeup of Lab 3. Web Homework Set 6 closes at 10 PM.

Week 9:

Monday, November 2. Lecture.

Edwards and Penney section 5.1, continued.

Wednesday, November 4. Lecture.

Homogeneous constant-coefficient linear systems and eigenvalues. Edwards and Penney section 5.2.

Thursday, November 5. Lab.

Lab 4. Due at beginning of lab: Prelab assignment for Lab 4.

Friday, November 6. Lecture.

Edwards and Penney section 5.2, continued. Due to recitation instructor by 5 PM: Homework Set 7. Web Homework Set 7 closes at 10 PM.

Week 10:

Monday, November 9 Lecture.

Mechanical vibrations governed by second-order systems of differential equations. Edwards and Penney section 5.3. Review.

Wednesday, November 11. Lecture.

Phase portraits for autonomous systems, and stability of equilibria. Edwards and Penney section 6.1.

Thursday, November 12. Recitation.

Review.

Friday, November 13. Lecture.

Linear and almost linear systems. Linearization and the Jacobian matrix. Edwards and Penney section 6.2.

Week 11:

Monday, November 16. Lecture.

Review. Test 2, 6–8 PM.

Wednesday, November 18. Lecture.

Ecological models of predators and prey. Edwards and Penney section 6.3.

Thursday, November 19. Lab.

Lab 5. Due at beginning of lab: Prelab assignment for Lab 5.

Friday, November 20. Lecture.

Nonlinear mechanical systems. Edwards and Penney section 6.4. Due to recitation instructor by 5 PM: Homework Set 8 and Writeup of Lab 4. Web Homework Set 8 closes at 10 PM.

Week 12: (Thanksgiving Holiday)

Monday, November 23. Lecture.

Review.

Wednesday, November 25. Lecture.

Laplace and inverse Laplace transforms. Edwards and Penney section 7.1.

Week 13:

Monday, November 30. Lecture.

Application of Laplace transforms to initial-value problems for constant-coefficient linear equations and systems. Edwards and Penney, section 7.2.

Wednesday, December 2. Lecture.

Laplace transforms involving translation in time and in the transform variable, and use of partial fraction representations. Edwards and Penney section 7.3.

Thursday, December 3. Recitation.

Review.

Friday, December 4. Lecture.

Products of Laplace transforms and convolution integrals. Differentiation and integration of Laplace transforms. Edwards and Penney section 7.4. Due to recitation instructor by 5 PM: Homework Set 9. Web Homework Set 9 closes at 10 PM.

Week 14:

Monday, December 7. Lecture.

Laplace transforms of periodic and piecewise continuous functions. Edwards and Penney section 7.5.

Wednesday, December 9. Lecture.

Impulses (delta functions) and impulse response. Edwards and Penney section 7.6.

Thursday, December 10. Recitation.

Review.

Friday, December 11. Lecture.

Review. Due to recitation instructor by 5 PM: Homework Set 10 and Writeup of Lab 5. Web Homework Set 10 closes at 10 PM.

Week 15: (Last Week of Classes)

Monday, December 14. Lecture.

Review.

Thursday, December 17.

Final Exam, 8–10 AM.