

MATH 250 ORDINARY DIFFERENTIAL EQUATIONS

Spring 2008

COURSE DESCRIPTION: Ordinary Differential Equations (3:3:0) Students who have passed Math 251 may not schedule this course for credit.

PREREQUISITE: Math 141 GQ.

TEXT: *Elementary Differential Equations*, 8th Edition, by Boyce-DiPrima, published by John Wiley & Sons, Inc. ISBN: 0-471-43339-X

COURSE DESCRIPTION and NUMBER of LECTURES

INTRODUCTION

- 1.1-2 Direction fields, Solutions of Some DE's 1
- 1.3 Classification of DE's 1

FIRST ORDER DE's

- 2.1 Linear Equations with Variable Coefficients 2
- 2.2 Separable Equations 1
- 2.4 Differences Between Linear and Nonlinear Equations 1
- 2.5 Autonomous Equations and Population Dynamics 1

NUMERICAL METHODS

- 2.7 Numerical Approximations: Euler's Method and
- 8.3 Improvements on the Euler Method 1

SECOND ORDER LINEAR EQNS

- 3.1 Homogeneous Equations with Constant Coefficients 1
- 3.2 Fundamental Solutions of Linear Homogeneous Equations 1
- 3.3 Linear Independence and the Wronskian 1
- 3.4 Complex Roots of the Characteristic Equations (also review complex arithmetic) 2
- 3.5 Repeated Roots; Reduction of Order 2
- 3.6 Nonhomogeneous Equations; Method of Undetermined Coefficients 4
- 3.7 Variation of Parameters 1
- 3.8 Mechanical Vibrations (omit electrical vibs) 2

HIGHER ORDER LINEAR EQNS

- 4.1 General Theory of n th Order Linear Equations 1
- 4.2 Homogeneous Equations with Constant Coefficients 1

THE LAPLACE TRANSFORM

- 6.1 Definition of the Laplace Transform 1
- 6.2 Solution of Initial Value Problems 2

SERIES SOLUTIONS OF SECOND ORDER LINEAR EQNS

- 5.1 Review of Power Series 1
- 5.2 Series Solutions Near an Ordinary Point, Part I 2
- 5.3 Series Solutions Near an Ordinary Point, Part II 1

SYSTEMS OF FIRST ORDER LINEAR EQUATIONS AND STABILITY

- 7.1-3 Introduction to Systems of Differential Equations and review of eigenvalues and eigenvectors 2
- 7.4 Basic Theory of Systems of First Order Linear Eqns 1
- 7.5-8 Classification of critical points and sketching phase portraits 4
- 7.9 Nonhomogeneous Linear Systems 1

NONLINEAR DIFFERENTIAL EQNS AND STABILITY

- 9.1 The Phase Plane: Linear Systems 1
- 9.2 Autonomous Systems and Stability 1

REVIEW PERIODS 3 (before each exam)

NOTES: A software which draws direction fields and trajectories is freely available at the site <http://math.rice.edu/dfield/dfpp.html>.

EXAMINATIONS: Two 75-minute evening (6:30-7:45pm) examinations will be given during the semester and a comprehensive final examination will be given during the final examination period. **The use of calculators is not permitted. You must bring your University ID to the exam.** The dates and places of the two exams are as follows:

EXAM I: Feb. 27, 2008 EXAM II: March 27, 2008

Both in 100 Thomas Building

CONFLICT EXAMINATIONS: For the two mid-semester examinations, there is a conflict examination from 5:05 to 6:20 PM on the same night as the regular exam. You must have a valid reason for taking the conflict exam, and **you need to sign up with the Instructor at least three days before the exam date.**

MAKEUP EXAMINATIONS: Students who have a valid verifiable reason are permitted to schedule a makeup examination at the discretion of the instructor. **You need to sign up with your instructor at least three days before the exam date.** The date and place will be announced later.

COURSE GRADES: Grades will be assigned on the basis of 500 points, distributed as follows:

Examination I: 100 points

Examination II: 100 points

Quizzes and homework: 150 points

Final Examination: 150 points

ACADEMIC INTEGRITY STATEMENT: “Academic dishonesty includes, but is not limited to, cheating, plagiarizing,...facilitating acts of academic dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students...A student charged with academic dishonesty will be given oral or written notice of the charge by the instructor. If students believe that they have been falsely accused, they should seek redress through informal discussions with the instructor, the department head, dean or campus executive officer. If the instructor believes that the infraction is sufficiently serious to warrant the referral of the case to Judicial Affairs, or if the instructor will award a final grade of *F* in the course because of the infraction, the student and instructor will be afforded formal due process procedures.” From *Policies and Rules, Student Guide to the University*, Policy 49–20. Based on the *University’s Faculty Senate Policy 49-20*, a range of academic sanctions may be taken against a student who engages in academic dishonesty. Please see the *Eberly College Academic Integrity* homepage for additional information and procedures.

TUTORS: A (paid) tutors list is maintained in the Math Department Undergraduate Office. It is available online at <http://www.math.psu.edu/ug/PrivateTutorList.htm>.

INSTRUCTOR: Professor Winnie Li

OFFICE HOURS: MWF 1:25-2:15 and by appointment

OFFICE: 326 McAllister Building

E-MAIL: wli@math.psu.edu

WEBSITE: <http://www.math.psu.edu/wli>

POLICY ON HOMEWORK ASSIGNMENTS AND QUIZZES: Homework will be assigned daily and collected on the announced due date, usually once per week. Quizzes will be given frequently. Due to the limited grading hours allotted to this course, the grader will grade all quiz problems and selected homework problems. **THERE WILL BE NO MAKE-UP QUIZZES.** Late homework (no later than 3 days) might be accepted under special circumstances. However, the instructor and the grader reserve the right of acceptance.