MATH 250 ORDINARY DIFFERENTIAL EQUATIONS

FALL 2008

CATALOG DESCRIPTION: Ordinary Differential Equations (3:3:0) First- and second-order equations and applications; Laplace transform solutions; systems of first order equations. 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 and DiPrima, published by John Wiley & Sons, Inc., ISBN: 978-0-471-43339-2

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
- 2.3 Modeling with First Order Equations (do mixture, interest and air resistance) 2
- 2.4 Differences Between Linear and Nonlinear Equations 1
- 2.5 Autonomous Equations and Population Dynamics 1

SECOND ORDER LINEAR EQUATIONS
- 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 3
- 3.7 Variation of Parameters 1
- 3.8 Mechanical Vibrations (omit electrical vibs) 1

THE LAPLACE TRANSFORM
- 6.1 Definition of the Laplace Transform 1
- 6.2 Solution of Initial Value Problems 2
- 6.3 Step Functions 3
- 6.4 Differential Equations with Discontinuous Forcing Functions 2
- 6.5 Impulse Functions 1

SYSTEMS OF FIRST ORDER LINEAR EQUATIONS
- 7.1-3 Intoduction to Systems of Differential Equations and review of eigenvalues and eigenvectors 2
- 7.5-8 Classification of critical points and sketching phase portraits 3

NONLINEAR DIFFERENTIAL EQUATIONS AND STABILITY
- 9.1 Phase portraits and stability 1
- 9.2 Autonomous systems and stability 1
- 9.3 Almost linear systems 2

REVIEW PERIODS = 3 (before each exam)

NOTES: A superb piece of software called dfield, which draws direction fields and trajectories (with initial condition defined by a click of the mouse), 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. No books or notes may be used on the examinations unless otherwise stated by the instructor. **The use of calculators is not permitted. You must bring your University ID to the exam.** The two exams are scheduled on the following dates:

EXAM I: Sept 24, 2008 EXAM II: Oct. 30, 2008

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. If you have a conflict with the regular exam time, such as a class or other scheduled activity, you may sign up to take the conflict exam. You must have a valid reason for taking the conflict exam, and **you need to sign up by one week before the exam date.** You will be given the room for the conflict exam when you sign up. **Students must bring their University ID to the conflict exam.** The ID will be checked by the exam proctor. Although the conflict exam will end at 6:20, no student will be permitted to leave the exam room before 6:25. A student who leaves before 6:25 will receive a grade of zero on the exam and will not be allowed to retake it.

MAKEUP EXAMINATIONS: Students who have a valid verifiable reason, such as illness or a class during both the conflict and regular exam times, are permitted to schedule a makeup examination at the discretion of the instructor. The date and location of the make-up exam will be announced later. In order to take a makeup exam, **students must sign up with your instructor at least three days before the exam date.**

FINAL EXAMINATION: The final exam will be given during Finals Week, December 15-19. When the final exam schedule is released, you will be given information on filing for conflict exams if you have two exams at the same time, or three or more exams during a 15 hour period. These are the only valid reasons for filing for a conflict exam. **No make-up final exam will be given.** Until schedule is known, do not arrange to leave University Park before Dec. 19.

COURSE GRADES: Grades will be assigned on the basis of 450 points, distributed as follows:

Examination I:	100 points
Examination II:	100 points
Homework and quizzes:	100 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: If you need extra help, (paid) tutors list is maintained in the Math Department Undergraduate Office in room 104 McAllister building. It is available online at http://www.math.psu.edu/ug/PrivateTutorList.htm.

MATH 250 – Fall 2008

INSTRUCTOR: Professor Ping Xu

OFFICE HOURS: MF 3:30-4:30pm, and by appointment

OFFICE: 329 McAllister Building

e-MAIL: ping@math.psu.edu

homepage: http://www.math.psu.edu/ping/math250.htm

POLICY ON HOMEWORK ASSIGNMENTS AND QUIZZES: Homework will be assigned every Monday and be posted on the instructor's homepage. It will be collected in class in the following Monday. Quizzes will be given occationally. Due to the limited grading hours alloted to this course, the grader will grade all quiz problems and selected homework problems. THERE WILL BE NO MAKE-UP QUIZZES. NO LATE HOMEWORK WILL BE ACCEPTED.