GMU Department of Mathematical Sciences
Math 214: Elementary Differential Equations
Fall 2008, TR 4:30-5:45pm, Room 207, Innovation Hall

Instructor:
Prof. Maria Emelianenko
Email: memelian@gmu.edu
Phone: (703) 993-9688
Office: Room 226A, Science and Tech I
Office Hours: TR 2-3pm and by appt

Text: Elementary Differential Equations by W.E. Boyce - R.C. DiPrima, 8th Edition, 2005, John Wiley & Sons, Inc.

Website: Main course website `http://math.gmu.edu/~memelian/teaching/Fall08` and Blackboard website `http://gmu.blackboard.com`. Please check both sites frequently for updates and announcements.

Calculators: Calculators may be used (but are not required) on homework assignments. Calculators are not allowed for quizzes or exams.

Examinations: There will be two 75-minute in-class midterm examinations. The comprehensive final exam will be given during the finals week, **December 9, 4:30-7:15pm**. Students should not make arrangements to leave University Park before Dec. 9, 2008.

Makeup/Conflict Midterm Exams: Only students with official University conflicts, or a valid, documented excuse, such as illness, will be permitted to schedule conflict or late make-up examinations. Students are responsible for requesting permission from the instructor at least three days before the regularly scheduled examination, except in emergency circumstances. No make-up final exams will be given.

Grades: Grades will be assigned according to the percent system given below:

25% midterm examination I **Thr. Oct. 2, 4:30 p.m.**
25% midterm examination II **Thr. Nov. 20, 4:30 p.m.**
25% final examination **Tue. Dec. 9, 4:30 p.m.**
15% in-class and online quizzes
10% participation

Homework and quizzes: Homework assignments will be mostly analytical and will contain problems from the textbook as well as other exercises. Occasional computational assignments will be given to enhance understanding of the context and application areas. Completing homework assignments is essential for gaining a good grade in the course. Solutions to homework problems will be discussed in class on the day they are due. It is students' responsibility to allow for enough time during the week to work on the homework problems and review the solution sets. Regular quizzes will be given either in class or online to test the knowledge of the material.

Participation: Students will be expected to actively participate in classroom discussions and take part in online activities. Several mandatory surveys and learning modules/quizzes will be given at the Blackboard website during the course of the semester.

Tentative Schedule of Lectures

INTRODUCTION
1.1 Direction fields
1.2 Solutions of Some DE's
1.3 Classification of DE's

FIRST ORDER DE's
2.1 Linear Equations: Method of Integrating Factors
2.2 Separable Equations
2.3 Modeling with First Order Equations
2.4 Differences Between Linear and Nonlinear Equations
2.5 Autonomous Equations and Population Dynamics
2.6 Exact Equations
2.7 Numerical Approximations: Euler's Method

NUMERICAL METHODS
8.2 Improvements on the Euler Method
8.3 The Runge-Kutta Method

SECOND ORDER LINEAR EQNS
3.1 Homogeneous Equations with Constant Coefficients
3.2 Fundamental Solutions of Linear Homogeneous Equations
3.3 Linear Independence and the Wronskian
3.4 Complex Roots of the Characteristic Equations
3.5 Repeated Roots; Reduction of Order
3.6 Nonhomogeneous Equations; Method of Undetermined Coefficients
3.8 Mechanical Vibrations
3.9 Forced Vibrations

THE LAPLACE TRANSFORM
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

SYSTEMS OF FIRST ORDER LINEAR EQUATIONS
7.1 Intoduction to Systems of Differential Equations
7.5-9 Classification of critical points and sketching

NONLINEAR DIFFERENTIAL EQUATIONS AND STABILITY
9.1 Phase portraits and stability
9.2 Phase portraits for Nonhomogeneous Linear systems
9.5 Linearize a nonlinear system at each of its critical points.
Phase portrait for predator-prey eqn.

Review for exams

This schedule is subject to change.

Academic Integrity Statement
All GMU policies regarding ethics and honorable behavior apply to this course.