MATH 2410Q - Spring 2010
Elementary Differential Equations

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Class: TuTh 12:30-1:45 in ARJ 413
Office Hours: TuTh 2:00-3:30
and by appointment

Textbook
Differential Equations, (3rd. Ed.) by P.Blanchard, R.L. Devaney and G.R. Hall, Brooks/Cole, ISBN 0-495-10807-3

Course Outline and Grades
We will use mathematical models to gain an understanding of real world problems and situations. In this course the mathematical models will always involve one or more ordinary differential equations. These equations will be "solved" with analytic, qualitative and numerical methods.
The exams are scheduled as follows:

- Exam I: 1.1-1.3,1.5-1.9 First Order ODE's (20%)
- Exam II: 2.1,2.2,3.1-3.6. 5.1 Systems of First Order ODE's (20%)
- Exam III: 4.1-4.3,6.1-6.5 Second Order ODE's and Laplace Transforms (20%)
- Numerical Project: 1.4,2.4,7.1,7.2,7.3 (10%)
- Final Exam : cumulative (30%)

The exact dates of these exams will be communicated in class. There will not be a curve, but there will be extra credit on each exam. The letter grade will be assigned according to the standard table: 93-100 gives A, 90-92 gives A-, 87-89 gives B+, 83-86 gives B, 80-82 gives B-, 77-79 gives C+, 73-76 gives C, 70-72 gives C-, 67-69 gives D+, 63-66 gives D, 60-62 gives D-, and 00-59 gives F.

Expectations
You are expected to come to class. If you miss a class, get notes from a fellow student, or from me. Although, be forewarned that my calligraphy is not the best. Please try to keep as consistent an attendance as possible; the book is good to convey intuitions behind ideas that you already somewhat know, but it is not a good resource for self study.
I also expect that you check your UConn e-mail on a more or less daily basis. I will use this canal also to send reminders about upcoming midterms and other important messages.

Makeups
If you have a valid reason for a makeup exam, send an email to corluy@math.uconn.edu a.s.a.p. A valid reason is a medical emergency, a death in the family, and, quite frankly, very little else. In all cases, you will be expected to bring in proof.

Student Athletes
If you are a student athlete, inform your instructor a.s.a.p. of interferences with your commitments

as an athlete (especially conflicts with exam dates). You will be expected to bring in a letter from the athletics department. The sooner you notify me, the better that I will be able to accommodate you.

Students with Disabilities
Inform your instructor a.s.a.p. of special needs that you may have like larger printouts of quizzes and exams or extra time on an exam. You will be expected to bring in a letter from the center for students with disabilities. The sooner you notify me, the better that I will be able to accommodate you.

Academic Integrity
A fundamental tenet of all educational institutions is academic honesty; academic work depends upon respect for and acknowledgment of the work and ideas of others. Misrepresenting someone else's work as one's own is a serious offense in any academic setting and it will not be condoned. Academic misconduct includes, but is not limited to, providing or receiving assistance in a manner not authorized by the instructor in the creation of work to be submitted for academic evaluation (e.g. papers, projects, examinations and assessments - whether online or in class); presenting, as one's own, the ideas, words or calculations of another for academic evaluation; doing unauthorized academic work for which another person will receive credit or be evaluated; using unauthorized aids in preparing work for evaluation (e.g. unauthorized formula sheets, unauthorized calculators, unauthorized programs or formulas loaded into your calculator, etc.); and presenting the same or substantially the same papers or projects in two or more courses without the explicit permission of the instructors involved. A student who knowingly assists another student in committing an act of academic misconduct shall be equally accountable for the violation, and shall be subject to the sanctions and other remedies described in The Student Code. Sanctions shall include, but are not limited to, a letter sent to the Dean of Students of the University; a grade of 0 on the assignment, quiz or exam; a grade of F for the course. It is well known that in some courses cheating is not punished as harshly as described above. This is not such a course.

Recommended Exercises

Section 1.1. Modelling Via Differential Equations.
Page 14, Problems 1, 3, 6, 12, 18

Section 1.2. Analytic Technique: Separation of Variables.
Page 33, Problems 1, 2, 6, 9, 12, 15, 16, 24, 25, 26, 35

Section 1.3. Qualitative Technique: Slope Fields.
Page 48, Problems 1, 6, 7, 9, 11, 13, 14, 15, 17

Section 1.5. Existence and Uniqueness of Solutions.
Page 73, Problems 1, 3, 5, 6, 8, 10, 13, 15

Section 1.6. Equilibria and Phase Line.
Page 91, Problems 1, 4, 5, 7, 9, 12, 15, 22, 23, 26, 37

Section 1.7. Bifurcations.
Page 107, Problems 1, 3, 7, 9, 10, 11, 15, 16

Section 1.8. Linear Differential Equations.
Page 123, Problems 1, 3, 6, 11, 13, 17, 20-24

Section 1.9 Integrating Factors for Linear Equations.
Page 135, Problems 1, 3, 4, 5, 17, 19, 23

Section 3.1. Properties of Linear Systems and Linearity Principle.
Page 252, Problems 5, 9, 11,14,17, 18, 25, 27, 29, 34

Section 3.2. Straight-Line Solutions.
Page 271, Problems 1-7 odd, 11, 13, 14a, 17

Section 3.3. Phase Planes for Linear Systems with Real Eigenvalues.
Page 287, Problems 1, 3, 5, 9, 11, 13, 19

Section 3.4. Complex Eigenvalues.
Page 305, Problems 1-14 odd, 23, 24

Section 3.5. Special Cases: Repeated and Zero Eigenvalues.
Page 321, Problems 5-8 (a) and (b), 9, 10, 11

Section 3.6. Second-Order Linear Equations.
Page 336, Problems 7-12, 30, 32

Section 2.1. Modeling Via Systems.
Page 160, Problems 2 (equilibrium points only), 19, 20

Section 2.2. The Geometry of Systems.
Page 182, Problems 1-8, 11, 13, 15, 19

Section 2.3. Analytic Methods for Special Systems.
Page 192, Problems 7, 8, 11, 12, 19

Section 5.1. Linearization.
Page 466, Problems 1, 3-6, 17, 18

Section 4.1. Forced Harmonic Oscillators.
Page 393, Problems 1, 3, 5, 9, 14, 17, 20, 21, 27, 31, 33, 36,39

Section 4.2. Sinusoidal Forcing.
Page 384, Problems 1, 5, 6, 9, 11, 14, 16, 19, 20

Section 6.1. Laplace Transforms.
Page 571, Problems 1, 3, 7, 9, 11, 15, 17, 27

Section 6.2. Discontinuous Functions.
Page 579, Problems 1, 3, 5, 9, 13, 14, 15, 16

Section 6.3. Second-Order Equations.
Page 593, Problems 5, 15-18, 19, 27, 29, 30, 31

Section 6.4. Delta Functions and Impulse Forcing.
Page 602, Problems 2, 5, 6b

Section 6.5 Convolutions.
Page 610, Problems 1-4, 5, 8, 9