Math 2410 (Section 004 and Section 006) Fall 2009

ELEMENTARY DIFFERENTIAL EQUATIONS

Text: Differential Equations, 3rd edition, by Paul Blanchard, Robert L.Devaney, Glen R.Hall; Brooks/Cole, Cengage Learning 2006.

Outline: We will study the linear differential equation of first and second order derived from physics and engineering. You will learn some basic methods and techniques to find the exact solutions of some type of differential equations.

Time MWF 10:00 - 10:50 Place: MSB 303 (Section 004)
Time MWF 1:00 - 1:50 Place: MSB 411(Section 006)

Dr. Krzysztof Kubacki – Office MSB 326, Phone: 486-3844
e-mail: kubacki@math.uconn.edu
Office hrs MF 11:00 - 12:00 am; W 12 - 13 pm; MW 5:30-6:00 pm; or by appointment

Grading: Two mid-term exams: 25%, 25%; final exam 35%; homework and quizzes 15%.

Exams: Mid-terms Wed 10/07 and 11/18.
Final exams: 12/14, 10:30-12:30 (Section 004); 12/16, 1- 3p.m. (Section 006).
Midterm 1 covers section 1.1 – 1.9. Midterm 2 covers Chapter 2.1 – 2.4 and 3.1-3.7.

Notes: Makeup exams will only be given in extreme cases such as a true emergency or illness with some proper document.

OUTLINE OF THE COURSE

Week	Dates	Content	Notes
1	08/31- 09/04	1.1, 1.2	
2	09/07-09/11	1.3, 1.4	M: Labor day
3	09/14-09/18	1.5, 1.6	M: last day to drop without W
4	09/21-09/25	1.7, 1.8	
5	09/28-10/02	1.9, Review	
6	10/05-10/09	2.1, 2.2	Exam I
7	10/12-10/16	2.3, 3.1	
8	10/19-10/23	3.2, 3.3	
9	10/26-10/30	3.3, 2.4	
10	11/02-11/06	3.4, 3.5	Last day to drop
11	11/09-11/13	3.6, 3.7	Review
12	11/16-11/20	4.1, 4.2	Exam 2
12	11/23-11/27		Thanksgiving recess
13	11/30-12/04	6.1- 6.3	
14	12/07-12/11	5.1 - 5.2, Review	

Homework (due to Wednesday)
(Sept. 9) Sec.1.1.: 1, 3, 5, 8, 15, 16, 19. Sec.1.2.: 2, 3, 6,-9, 15, 23, 26, 30, 33.
(Sept. 16) Sec. 1.3.: 1a, 6a, 12ab, 15, 18. Sec. 1.4.: 5, 6, 12.
(Sept. 23) Sec.1.5.: 1, 4, 9, 13, 14. Sec.1.6.: 3, 8, 9, 15, 20, 30, 33, 36, 39, 43.
(Sept. 30) Sec. 1.7.: 3, 5, 9, 12, 20. Sec. 1.8.: 3, 7, 8, 9, 11, 13, 19, 23, 27.

Math2410Q Fall 2009 Web Page (Sections 004 and 006)

Please read Syllabus and course outline. Additional information will be given here later on.

Practice Midterm Exams

- Please solve the folowing Practice Midterm Exam 1a. Solutions are here.
  See also Practice Midterm Exam 1b. Solutions are here
  Practice Midterm Exam 2 with solutions. Exam #2 tentatively scheduled on Wednesday November 18 (the last week before Thanksgiving).

Practice Final is already here; see also solutions .

- Section 004 Final Exam is on Monday, Dec. 14, 10:30-12:30 at MSB Math 303;
- Section 006 Final Exam is on Wednesday, Dec. 16, 1:00-3:00 at MSB Math 411.

Your grades: Final grades will be posted on PeopleSoft.

- Section 4 and Section 6.

Useful links. Software to draw:

- slope field and/or directional field
- vector field and 2D Direction field
- Euler's Method for Systems
- 3D plot

Lecture Notes:

- First Order ODE - geometric view, numerical view, analytic ideas. Slope field, integral curve.
- Euler's method does not work - Example
- Monday, September 14, Section 1.5 - Existence and Uniqueness of Solutions
- Monday, September 21, Section 1.9 Solving First Order Linear ODE (Will continue on Wednesday.)
- Comples numbers, complex exponentials (Monday, September 28).
- Comples numbers, complex exponentials - cd. See also solution by complexify the equation
- Friday Oct. 9th - **Section 2.1** Modeling via systems
- Monday Oct. 12 - Friday Oct. 16 - First Order Systems
- Monday Oct. 19 - Friday Oct. 23 - Matrix terminology
- Monday Oct. 26 - Friday Oct. 30 - Sect. 2.4 (Euler's Method for Systems), 3.2 (Straight-Line solutions), and 3.3 (Phase Planes for LS with real eigenvalues);
- Wednesday Nov. 4 - Section 3.4 (Complex eigenvalues). See also what if complex roots? covered some day previously;
- Friday Nov. 6 - Section 3.5 (Special Cases: Repeated and Zero Eigenvalues);
- Monday Nov. 9 - Section 3.5. Problem #18
- Friday Nov. 19 - Section 4.1. Forced harmonic oscillators.
- Wednesday Dec. 2 - Section 6.1. Laplace Transform and Friday Dec. 4 - Section 6.2. Laplace Transform of discontinuous functions.
- Monday Dec. 7 - Section 6.3. Second Order Equations, Wednesday Dec. 9 - A Forced

Harmonic Oscillator (see also problem #7 at Practice Final).

Homework

- (Oct. 28) Sec. 2.4.: 1, 3, 7, 8, 9, 12, 13, 14; and 3.1: 26, 27, 34.
- (Nov. 04) Sec. 3.2.: 1, 11, 12; and Sec. 3.3.: 4, 7, 9, 11, 13, 19, 21.
- (Nov. 11) Sec. 3.4.: 1, 3, 5, 7, 9, 11, 13, 16, 19; Sec. 3.5.: 1, 2, 5, 6.
- (Nov. 18) Sec. 3.5.: 3, 4, 7, 8, 19, 21b, 22b, 23; Sec. 3.6.: 1, 4, 6, 8, 10, 12.
- (Dec. 2) Sec. 3.6.: 13, 16, 18, 20, 22, 24, 26, 28, 38; Sec. 3.7.: 9, 10.
- or Sec. 4.1.: 3, 5, 6, 13, 14, 21; Sec. 4.2.: 1, 2, 3, 4, 5.
- (Dec. 9) Sec. 6.1.: 1, 3, 5, 7, 9, 11, 15; Sec. 6.2.: 1, 3, 5, 8, 9.

Solutions

- Solutions to problems #2, #4, #6, #7, #17, #18, and #19 from Section 1.1. Also solutions to Problems #8, #15, and #16 (if somebody need).
- Solutions to problems #4, #5, #7, #8, #10, #12, #13, #14, #16, #25, #31, #35, and #36 from Section 1.2. Also solutions to Problems #33 and #2, #3, #25, #30 (if somebody need it).
- **Solutions to some problems** from Section 1.3, Section 1.4., Section 1.5., Section 1.6., Section 1.7., Section 1.8..
- Comples numbers, complex exponentials - Problems with Solution suggestions
- Solution to Quiz#2, Quiz#3 and Quiz#4 problems.
- Solution to Section 2.1 Problems #1 - #6.
- **Solution to some problems** from Section 3.5, Section 3.6 and Section 3.8 problems.
- Solutions to Chapter 6 (Section 6.1., 6.2. and 6.3.) problems are here

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