Course Syllabus MTH244: Ordinary Differential Equations Fall2014

Instructor: Dr. Glenn Faubert

Goals of the course

MTH 244 is the first course in Ordinary Differential Equations. We will study mathematical techniques involving differential equations used in the analysis of physical, biological and economic phenomena. Emphasis is placed on the use of established methods, rather than rigorous foundations. We shall emphasize those methods that are capable of broad applications and that can be extended to various problems. The methods to be discussed include not only elementary analytical techniques that lead to exact solutions of certain classes of problems, but also include approximations based on numerical algorithms and series expansions.

Topics Include

First order differential equations (separable, homogeneous, linear, exact).
Existence and uniqueness theorems for differential equations
Linear differential equations – general theory (homogeneous and nonhomogeneous, constant and variable coefficients, undetermined coefficients, variation of parameters)
Systems of linear differential equations
Laplace transform and applications to solving linear differential equations
Solving linear differential equations with the method of series
Numerical solutions of ordinary differential equations

Text

The text for the class is Ordinary Differential Equations, third edition, by Finizio and Ladas. The second edition may be used as well, but the student is responsible to get corrections for the assignments. See the SAKAI homepage for more information about the text. It is assumed that will you have access to the text by the first class meeting. There will be a homework assignment given on the first class. Lack of a text does not excuse you from any assignment.

Sakai

SAKAI will be used in this class for all student/teacher electronic correspondence. Important class announcements, a grade book, submission of homework, and student/teacher messaging will all be done on SAKAI. If this is your first semester at URI, get comfortable with SAKAI right away! Go to the URI main page and click on SAKAI and start poking around.

Calculators

You may use a computer or calculator to help with your homework, however all work must be shown that supports your answer. Neither computers nor tablets nor calculators nor cellphones are allowed on any test.

Grading

Your grade will be based on three in-class tests, homework assignments (HW), announced quizzes, unannounced open-book quizzes, and unannounced attendance checks. Minimum points for letter grades are also shown.

Grade	Minimum %
A	92
A-	90
B+	87
B	82
B-	80
C+	77
C	72
C-	70
D+	67
D	60
F	0

Component	Value
Test 1	15%
Test 2	15%
Test 3	15%
Final Exam	25%
HW/Quizzes	20%
Mathematica	10%
Total	100%

Tests

Three tests will be given on the dates shown below. Tests are always closed-book. No questions will be taken during tests. No electronics of any kind are to be visible. Cell phones must always be off and out of sight during tests. Cell-phone interruptions during a test will be penalized 1 point per second of interruption. Any visible electronic device is a 5-point score deduction. Cell-phone or other electronics use during a test will be penalized 50 points. A missed test requires prior notification and written documentation satisfying the instructor before any make-up is allowed. If a sanctioned make-up is not taken then the grade for the test will be zero.

Homework Assignments (HW)

Each written HW assignment should be thought of as a small writing project. Each HW assignment grade is based 20% on format and 80% on content (see below). Each assignment must be type set or printed neatly, stapled, and slipped under my office door by noon on Friday OR submitted via the SAKAI assignment tool (not email, not in a message) before 10:10pm on Friday. Late assignments are accepted with a 50% penalty only if submitted to SAKAI by Saturday at 10:10pm. SAKAI will enforce this rigidly! To be excused from a missing/tardy homework assignment you must provide written documentation that is acceptable to the instructor. This written documentation must account for the day prior to the due date as well. (Official URI functions, and illness with a doctor's note, for example.) Start on the homework assignments early! Some students score significantly lower on the homework assignments than on the tests. Often this is for failing to follow the format or for starting written assignments the night before they are due. These assignments will require a good deal of thinking. The specifics of some assignments will be provided to you via SAKAI. Students may work on homework alone or with ONE other student. Students who work with another student must include the name of that student on their homework. Students handing in identical or near-identical writing assignments and who do not name their partner will split the homework grade. (If two students hand in near-identical work their grades will be halved, for example.) Please read the section on the Honor Code below.

A perfect format grade for written assignments requires:
1. your name date and assignment number on top
2. each problem numbered with a typed or printed out problem statement for each problem
3. tidy organized exposition, typed or printed work
4. stapled pages for paper submissions.
5 SAKAI submissions are to be submitted in one file with pages in order and right-side up. Exports to pdf are preferred. Please avoid bulky jpg files.

A perfect content grade for written assignments requires:
1. the correct answers
2. the correct work and justification (unjustified, one number or one line answers –even if correct– are worth zero.)
3. clear, grammatical, precise, explanations where required

Attendance

Unannounced quizzes and random attendance checks may be used to encourage attendance. If a quiz is unannounced it will be "open book" and "open notes." Students who occasionally need to miss a class should notify their instructor BEFORE THE START OF CLASS on the day that they will miss. If a student provides such prior notice via SAKAI, he/she will be exempt from penalty for unannounced quizzes and random attendance checks. Note: This exemption does NOT apply to tests, homework or Mathematica assignments.

Honor code

If you are caught breaking the URI honor code, you could be given an F for the assignment or the entire class, or reported to the university for disciplinary action or dismissal. As a student of higher standards, you pledge to embody the principles of academic integrity. You may work with other students on your homework assignments as follows: You may discuss concepts, principles and methods with each other, however, you must prepare your own final submission separately. You are not to copy another student's homework. Collaboration among students is not permitted during examinations.

Special accommodations

Students with special requirements and proper documentation through Disability Services should inform their instructor as early as possible. University regulations require that documentation be provided at least one week before special consideration is given.

Course outline

On the next page is a comprehensive course outline; use it to keep up with the reading, plan your studying, find your homework assignments, know when your tests are, etc. We will follow the schedule quite closely, but of course it is subject to possible minor editing in the case of typos, unforeseen events, weather anomalies, etc.

Schedule for MTH244 sec 01 Fall 2014

Class	Date	Text/Topics/Tests	Practice Problems 3rd ed, but see ** below. Submit large numbered problems to SAKAI	HW Due 10:10 pm Every Friday
1	Th 9/4	1.1 Introduction	**4,5,9,11,14,15,**18,22,23,24,25,26,27	HW#1 (1.1)
2	Tu 9/9	1.2 Existence and Uniqueness	**1,3,**7,**10**	
3	Th 9/11	1.3 Variables Separable	**1,**11,**12,**16,19,**20,24,**28,29,30,31,**33**	HW#2 (1.2, 1.3)
4	Tu 9/16	1.4 First order linear DEs	**2,3,4,5,**6,7,24_4,**25_4,29_4,**35_4,41_4,44_4,**45_4**	
5	Th 9/18	1.5 Exact DEs	**1,5,11,**15,23_4,28_4,29_4,30_4,31_4,32_4,33_4,34_4,**36_4,41_4**	HW#3 (1.4, 1.5)
6	Tu 9/23	1.6 Homogeneous DEs	**1,5,7,12,**19_4,20_4,21_4,22_4,23_4,24_4,25_4,**28_4,29_4**	Mathematica #1
		1.7 Reducible to First Order DEs	1,**2,3,**4,8,**9,10**	
7	Th 9/25	2.2 Lin. Ind. & Wronskians	1,**3,5,**7,**8,**17,30,**33,**34,**35,**40,**43**	HW#4 (1.6, 1.7, 2.2)
8	Tu 9/30	2.4 Characteristic Eq. Of Homogeneous DEs	1,**2,**3,**4,**5,7,11,**12,**13,**14,**15,16,19,21,22,**23,**24,35,**38**	
		2.5 Homogeneous DEs w Constant Coef. General Sol.	**1,5,6,**8,**11,**12,13,14,**20,**21,23,24,**25,26,34,35,36**	
9	**Th 10/2**	**Test 1 covers 1.1–2.2**		HW#5 (2.4, 2.5)
10	Tu 10/7	2.6 Homogeneous DEs with Variable Coefficients	---	
		2.8 Reduction of Order	4,**5,**6,**7,**8,**9,**10,11,12,16,**17,**18,**19**	
11	Th 10/9	2.10 Non-Homogeneous DEs	**7,**8,**9,**10,11,**19,**20,**21,**22,**23**	HW#6 (2.8, 2.10)
12	Tu 10/14	2.11 Method of Undetermined Coefficients	7,**8,9,10,13,**14,**15,**16,**17,**18,**31,39,40,**43 to 50	
13	Th 10/16	2.12 Variation of Parameters	**1,3,5,7,8,**9,10,11,12,13	HW#7 (2.11, 2.12)
14	Tu 10/21	4.2 The Laplace Transform and its Properties	**19,**20,21,22,**23,**24,25,26,27,28,**29,**30,**31,**32,33,34,**35,**36, **39,40,**41,42,43,44,45,**46,**47,48,49,50,51,**52,**53,54,55,56	
15	Th 10/23	4.3 Laplace Transform applied to DEs	**1,**2,**3,**4,**5,6,**7,**8,9,**10,11,12,13,**14,**35	HW#8 (4.2,4.3)
16	Tu 10/28	3.1 Introduction to Linear Systems	**5,7,11,29**	
17	**Th 10/30**	**Test 2 covers chapters 2 & 4**		HW#9 (3.1)
18	Tu 11/4	3.2 Method of Elimination	**5,6,**7,**11,**12,**29_2**	
19	Th 11/6	3.3 Matrix Method	**5,**6,**7,**8,**14,20,25,**26,35	HW#10 (3.2, 3.3)
20	W 11/12	5.2 Power Series and Convergence	**1,2,3,4,5,7,11,**14,19	
21	Th 11/13	2.9 Method of Taylor Series	**1,3,**5,**7,9,**11,**13,**15,**17,**19	HW#11 (5.2, 2.9)
22	Tu 11/18	5.3 Ordinary and Singular Points	**5,6,7,8,9,10,11,**19	
		5.4 Power Series Sol to DEs about ordinary point	4,**5,**6,**7,11,19,**20	
23	Th 11/20	7.2 Numerical Solutions of DEs. Taylor's Method	**1,**2,**3,**4,**9,11**	HW#12 (5.3, 5.4, 7.2)
24	Tu 11/25	7.3 Numerical Solutions of DEs. Runge-Kutta Method	**1,3,9,**10	HW#13 (7.2, 7.3)
25	Tu 12/2	6.1 Boundary Value Problems	1,3,5,**7**	
26	**Th 12/4**	**Test 3 covers ch 3, 5, 7 and 2.9**		HW#14 (6.1)
F	**Th 12/11**	**Final Exam (8:00-11:00 am in class)**		Mathematica #2

** The 2nd edition problem numbering is the same as the 3rd edition except where noted with a subscript. Subtract the subscript from the problem number to get the corresponding problem number for the 2nd edition. (e.g. 23_4 means problem 19 in 2nd edition, 29_2 means problem 27 in 2nd edition etc.)

Homework assignments due on the Assignment tool of SAKAI at 10:10 pm on every Friday. The wise student will not wait till the last minute!
Mathematica assignments are due on the Assignment tool of SAKAI at 10:10 pm on date shown.
Assignments are accepted up to two calendar days late with 50% penalty and will be returned two days late. Due dates are enforced by SAKAI.
Test dates will not change unless the university is officially closed for the day. In such case the test will be given during the next class period.