University of Connecticut
Math 2410Q-004/013, Elementary Differential Equations, Spring 2018

Instructor Information

Instructor: Noah Hughes
Webpage: http://www.math.uconn.edu/~hughes/
Email: noah.hughes@uconn.edu (Expect responses only between the hours of 9am and 6pm.)
Office: Monteith, Room 322
Office Hours: Mondays and Wednesdays from 9:00-9:50 am, and by appointment.

Course Description and Requirements

Differential equations are used to describe systems which evolve with respect to some variable (e.g. *time*). Hence, they are one of the most useful tools available to engineers and scientists who seek to understand systems that change (e.g. weather systems, economies, or the movement of celestial bodies.) The goal of this course, in short, is to introduce the terminology and basic methods of analyzing, understanding, and (when possible) solving differential equations.
To do this, we will cover the majority of chapters 1 through 4 and roughly half of chapters 5 through 8 of the text. A detailed and tentative schedule is listed below.
From the department: Qualitative, analytical and numerical methods for first and second order single ordinary equations as well as first order constant coefficient linear system and some special nonlinear systems. Laplace transform and its application to differential equations.
Text: *A First Course in Differential Equations with Modeling Applications* 11th ed., by Dennis G. Zill
Note that this book is available to you digitally and free of charge through WebAssign. If you wish to purchase a hard copy, email me.
Prerequisites: MATH 1132, or 121. Recommended preparation: a grade of C- or better in MATH 1132; and MATH 2110 or 220. Not open for credit to students who have passed MATH 2420. Open to sophomores or higher. Familiarity with a few concepts in linear algebra (MATH 2210) will also prove useful.
Calculators: You are welcome to use calculators while working on homework. They will *not* be allowed during exams or quizzes.

Assessments

WebAssign: (worth 15% of your grade)
You will have online assignments given through WebAssign. There will be homework assignments for each section of the text. The availability and submission deadlines for each assignment will be roughly as follows:

- Availability: The assignments pertaining to material in a given week will be made available on Sunday night of that week.
- Due dates: The assignment for a section will be due on the Wednesday of the week following the one in which the section was covered in class.

These are set so that you will have ample time to visit me in office hours before an assignment is due.

Note: You will get five attempts for each question that is not multiple choice and fewer than five attempts for each multiple choice question; the exact number of attempts will depend on the number of choices. After each attempt, you will be told whether your answer is correct or not. If you are not able to get the correct answer after your initial attempts, I recommend that you seek help from me, the Q-Center, a tutor, or another student before attempting to answer the problem again. *Please do not use all of your attempts before asking for help.*

To access WebAssign, follow the link given on HuskyCT. If you have any trouble, contact me.

Note: When accessing your online homework, use Firefox or Chrome as your browser; there are problems that can occur if you use Internet Explorer or Safari. Useful tips on using WebAssign can be found here.

Important: BUYING THE BOOK AND WEBASSIGN ACCESS CODE

You don't have to!

Everyone already has full access to WebAssign and the textbook. Please contact me if you don't.

Written homework: (worth 15% of your grade)

To assess your ability to lucidly communicate mathematics, weekly written assignments will be given. These will consist of 1 or 2 problems for each section covered in a week. They will be graded for partial credit with regards to the following rubric.

Each question is worth 4 points, awarded as follows:

4 points: The solution is correct and presented in a neat manner which is easy to follow.

3 points: The work is correct but messy or hard to follow. *Or*, the work is neat and mostly correct but a mistake is present.

2 points: Multiple mistakes are present but you made significant progress towards a complete solution by demonstrating the techniques and ideas needed.

1 point: You have demonstrated that you have an idea of what is needed to be done but can not make significant progress towards a solution.

0 points: You did not attempt the problem or can not demonstrate an understanding of what is needed to find a complete solution.

The availability and submission deadlines for each assignment will be roughly as follows:

- Availability: The written assignments will be posted on the course webpage at the beginning of the week containing the pertinent material.
- Due dates: The written assignment for a given week will be due at the beginning of class on Friday of the following week.

The purpose of these assignments is two-fold: first, I will assess your understanding and mathematical writing ability. Second, you will receive feedback on written submissions so as to prevent you being surprised by my grading style on the exams. A few tips for writing mathematics (in this course) follow:

- When in doubt, use more English.
- Know the difference between symbols like "=" and "⇒."
- English is read left to right, top to bottom, so your mathematics should be as well.
- When in doubt, use *more* space. Writing your solutions as if they were double spaced will only increase legibility. I have had students in the past who were perfectly cogent but illegible due to the arbitrary space restrictions they subjected themselves to. It is common to require separate pages for each problem. I will not do this, but it is a good guideline.

Exams:

There will be three exams in total:

- Exam 1 (Monday, February 12, worth 20% of your final grade)
- Exam 2 (Friday, March 23, worth 20% of your final grade)
- Final exam (Date to be announced, cumulative, worth 30% of your final grade)

Make-Up Work

Unexcused absence during exams or quizzes will be tolerated only in highly unusual documented circumstances (e.g., hospitalization). You may arrange with me well in advance if accommodations are needed.

If you do miss a class, consult the on-line schedule to see what you missed.

Tentative Schedule

A tentative outline for the course can be found on the following page.

Academic Integrity

Integrity is a vital to a successful and rewarding academic experience. You are expected to observe the University's Academic Integrity Policy while participating in this course. Academic misconduct of any sort is subject to the consequences outlined therein. More information can be found at the Office of Community Standards.

Special Accommodations

Student athletes and students with disabilities should inform me of their commitments as an athlete, or any special needs that they have, etc. within the first three weeks of the semester. A letter from the Athletics Department or the Center for Students with Disabilities will be required for accommodations to be given. For more information on academic accommodations (including religious observances) visit the University of Connecticut Policy & Procedures website.

Disclaimer

I reserve the right to make changes to this document in partiality or entirety at any point during the semester.

Week	Material
1 1/15 - 1/19	1.1 Definitions and terminology
2 1/22 - 1/26	1.2 Initial value problems 1.3 Differential equations as mathematical models 2.2 Separable equations
3 1/29 - 2/2	2.1 Solution curves without a solution (direction fields) 2.6 A numerical method (Euler's Method)
4 2/5 - 2/9	2.3 Linear equations 2.5 Solutions by substitutions
5 2/12 - 2/16	**Exam 1** on Monday 2/12 covering: 1.1 - 1.3, 2.1 - 2.3, 2.5, 2.6 B.1 Basic definitions and theory B.2 Gaussian and Gauss-Jordan elimination
6 2/19 - 2/23	B.3 The eigenvalue problem 8.1 Preliminary theory - Linear systems
7 2/26 - 3/2	8.2 Homogeneous linear systems
8 3/5 - 3/9	3.1 Linear Models 3.2 Nonlinear models
9 3/12 - 3/16	Spring break, no class
10 3/19 - 3/23	3.3 Modeling with systems of first-order equations **Exam 2** on Friday 3/23 covering: B.1 - B.3, 8.1, 8.2, 3.1 - 3.3
11 3/26 - 3/30	4.1 Preliminary theory - linear equations 4.3 Homogeneous linear equations with constant coefficients
12 4/2 - 4/6	4.4 Undetermined Coefficients - Superposition Approach 4.6 Variation of Parameters
13 4/9 - 4/13	5.1 Linear models: initial - value problems (spring/mass Systems, circuits
14 4/16 - 4/20	7.1 Definition of the Laplace transform 7.2 Inverse transforms and transforms of derivatives
15 4/23 - 4/27	7.3 Operational properties I
Finals week 4/30 - 5/4	Finals week. **Final exam**, cumulative, date and location to be announced.