Math 235, Fall 2016

Instructor: Paul T. Allen

Plan for the course

The topics of the course are:

- Modeling with differential equations

- Solution theory to first order linear systems

- Qualitative analysis of first order equations and first order systems

- Second order equations modeling oscillations and resonance

- Hamiltonian systems

- Special functions

There is no required text. Some notes, together with homework assignments, will be posted on the course website. Students must take good notes in class!

Learning outcomes

- Use of LaTeX, and either Mathematica or Sage

- Construction and interpretation of differential equation models

- Analysis of differential equations: theoretical, qualitative, numerical

- Interpretation of analysis; written presentation of analysis and interpretation

Homework

Homework is collected daily and is to be submitted in the SQRC. When submitting work, please make sure that

- your name and the assignment number/title are clearly written at the top of the first page,

- your work is neatly presented, and

- all pages are stapled together.

Work that does not meet these standards are at risk of being placed in to one my "miscellaneous" folders, from which few documents ever return.

In general, credit is not given for late or incomplete work. I may, at my discretion, accept late work and file it away; such work is considered only if your course grade is borderline.

Exams

- There are three "midterm" exams, the dates of which appear on the course website.

  Note that one of the exams is not given during the official class time. Students with a conflict must advise the instructor by sending an email during the first week of classes.

- There is a cumulative final exam, given during the officially scheduled final exam period.

Writing assignments

There are several writing assignments throughout the semester. These must be typed using the LaTeX markup language. Students are to submit both their LaTeX code (digitally) as well as the typeset document (hard copy).

Writing assignments are graded for

- correct, appropriate, and complete mathematical analysis of the problem at hand;

- appropriate use of technology (including both LaTeX and Mathematica/Sage); and

- clear and concise writing that is both grammatically and mathematically correct.

Course grades

- Course grades are to be a reflection of students' success in engaging with the course material, analyzing that material, and synthesizing the content in to a coherent framework that can be applied to subjects beyond the course.

- Course grades are computed as follows:

  1. A preliminary grade is computed by calculating a weighted average of all scores, according to the following weighting:
     - 20% Homework
     - 40% Mid-term exams
     - 10% Writing assignments
     - 30% Final exam

  2. After computing the preliminary grade, I make adjustments based on inconsistent coursework (such as disregarding an outlier), trends throughout the semester (such as improvement), and other factors I deem relevant.

  3. Finally, I revisit the individual grades in view of the grade definitions provided by the College Catalog, seeking indicators of the synthesis of course material.

- I emphasize that ultimately grades are assigned according to the definitions in the college catalog, based on my assessment of the student's knowledge and synthesis of the course material, as documented by the assignments and exams. While a weighted average of individual scores is a critical tool for making this assessment, in no way is such an average definitive.

- Finally, I note that students fail the course if either of the following occurs:

  Insufficient participation Missing the equivalent of two weeks of class sessions, or missing one of the exams, will lead to a failing grade. Exceptions to this policy require documented extenuating circumstances.

  Gross negligence Demonstration of gross ignorance or complete lack of understanding of key concepts on exams will lead to a failing grade. In particular, a student who has accumulated what might be construed as 'technically enough points to pass' but demonstrates a "clearly inadequate" lack of understanding which is "unworthy of credit" will be awarded a failing grade.

4.0 scale

All coursework is graded on the 4.0 scale. The mapping between numerical and letter grades, together with definitions of letter grades, can be found below. That table also displays the official definitions from "Policies and Procedures" section of the Undergraduate Catalog, together with an interpretation for the purposes of a mathematics course (in italics).

Grade A (4.0) Outstanding work that goes beyond analysis of course material to synthesize concepts in a valid and/or novel or creative way.

Computational problems are completely and correctly executed in a manner which displays a complete grasp of the theory behind the computation. Theoretical responses display a thorough understanding of the both precise details and the larger framework at hand.

Grade B (3.0) Very good to excellent work that analyzes material explored in class and is a reasonable attempt to synthesize material.

Computational problems are executed with minimal, insignificant errors (such as dropping a sign) and contain some indication that the relevant theory being used is understood. Theoretical responses display significant progress towards understanding of how the details fit in to a larger framework.

Grade C (2.0) Adequate work that satisfies the assignment, a limited analysis of material explored in class.

Solutions to computational problems display significant, though perhaps mechanical, understanding of basic procedures. Theoretical responses display an preliminary understanding of the topic at hand, but lack connections to the larger framework.

Grade D (1.0) Passing work that is minimally adequate, raising serious concern about readiness to continue in the field.

Both computational and theoretical responses display some non-trivial knowledge and skills, but raise concerns about whether basic ideas and methods are understood.

Grade F (0.0) Failing work that is clearly inadequate, unworthy of credit.

Fundamental misunderstandings, mis-use of methods or theory, seemingly random or un-related material, etc.

Table 1: Official definition of grades, as they appear in the College Catalog, together with interpretation for the purpose of this course (in italics).