MATH 231, Discrete Matheamtics

Syllabus, Spring 2021

Material. The textbook for the course is **Ordinary Differential Equations and Linear Algebra**, by Todd Kapitula. The focus of this book is on linear differential equations: scalar equations of n^{th} order, and 1^{st} order systems. We will cover most sections in Chapters 1–5, perhaps omitting case studies and Section 3.6. Though the separable ODEs of Section 6.1 are often nonlinear, we will also discuss how to solve them.

Learning Outcomes. The student who successfully completes this course, will be able to

- use terms of linear algebra such as `linear independence`, `span`, `basis`, `column space`, `dimension`, `subspace`, etc. accurately in their own writing, and understand them correctly when reading assignments and exercises using these terms.
- apply Gaussian elimination in diverse settings, such as finding null and column spaces of matrices, finding eigenvectors, inverting a matrix, etc.
- articulate the relationship between solutions of nonhomogeneous linear problems and their homogeneous counterparts, and apply appropriate teechniques (factoring the characteristic polynomial, variation of parameters, undetermined coefficients) for finding the homogeneous and particular parts of solutions.
- solve scalar differential equations and initial value problems using analytical techniques such as separating variables or the Laplace transform.
- solve homogeneous systems of ODEs using eigenvalues and eigenvectors.
- derive rudimentary DE models based on physical descriptions of first-order problems.

Student achievement of with regard to these outcomes will be assessed via homework and test questions.

Class Policies. For class meetings, please

- Adhere to university policy on masks, social distancing, daily self-monitoring of your health, using the #CampusClear app each day and following its directives. (Consider your absence "excused" if you are told to stay at home that day.)
- Attend class synchronously and, except under special circumstances, in person.
- Come to class equipped with an e-device capable of running software remotely through a browser, and participating in group-work via Microsoft Teams. Be disciplined about pulling this device out, using it only for suitable class-related work.

- Attend to your email during the day to see if there are any notices from me, such as assignment details, things to do to prepare for class, or changes in class procedure.
- Arrive at the classroom, if possible, a few minutes early, seeing to sanitation of your work surface as you see fit. (We will follow a "pre-sanitation", not a "post-sanitation" routine.)
- Take, as "yours", the seat you use on the first instance attending class, and continue to sit in that seat perpetually, even if one you like better is available during some class period. Likewise please do not reposition your chair or table.

In addition, you are expected to

- submit homework by the due date/time.
- take tests on the specified dates at the specified times. Those dates may be found on the class calendar.
- follow up with questions over ideas you are not getting before the next class meeting. Practically speaking, this almost certainly implies giving some serious attention to homework between each meeting.
- determine for yourself the level of importance of various topics from the course. Test information prior to test dates will indicate what chapters/sections are fodder for the upcoming test, but not attempt to "boil things down" to just a few ideas or exercises.

Occasionally there are special circumstances that require class policies be adjusted for a particular student. In such cases, it is the responsibility of the student to inform me of the situation **as soon as possible**, so that appropriate arrangements can be made.

Accommodations. Reasonable academic accomodations will be made for individuals with documented disabilities. Any student who this concerns should notify one of the coordinators for services for students with disabilities in the Center for Student Success. That student should also meet with me during the first two weeks of the semester to discuss academic accomodations.

Grading. The various weights will be as follows:

- WebWork assignments: 9%
- Hand-checked assignments: 8%
- Tests: 57%
- Final Exam: 26%

If, at any point in the course, you wish to estimate your grade, use this app to calculate your approximate grade as a weighted average according to the weights given above, leaving out those components that have not yet occurred.

There is a channel in our Microsoft Teams course called "Homework issues", which can serve as a space for collaboration. I encourage you to discuss homework problems with other students. Just follow the principle that the write-up must be your own work, not piecework grafted from other students' work.

I define cheating in a manner that includes, but is not limited to, use of unauthorized sources, notes or devices, and copying from the work of another student (or knowingly allowing a student to copy from your work). Such behavior is unacceptable, and will, in the first instance, result in a score of zero. A second offense will result in dismissal from the course with a course grade of "F". Read more in Calvin's Student Conduct Code.

Exceptions. I reserve the right to make changes or exceptions to course policies, including those described in this document, either for the entire class or for individuals. The ultimate goal in this course is **learning**, and formal requirements should not unnecessarily stand in the way of that. Thus, if you think that any of the conditions of the course are interfering with learning, please speak with me about this, and we will consider what can be done.