Math 3319–001: Differential Equations & Linear Algebra
Spring 2020, Mon/Wed 1:00–2:20 PM, PKH110

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Course Info: MATH 3319–001, Mon/Wed 1:00–2:20 PM, PKH110
Pre/corequisite: MATH 2326
Textbook: Goode & Annin, *Differential Equations and Linear Algebra*, **4th** ed., Pearson, 2016.
Course home page: `http://mathed.uta.cloud/kribs/3319.html` or see Canvas
Last day for withdrawal: April 3
Final exam: Friday, May 15, 11:00 AM–1:30 PM (note time)
Other exam dates (tentative): Wed Feb 26, Wed Apr 8, both in class
Course content (from the Undergraduate Catalog): Introductory course with emphasis on solution techniques. Ordinary differential equations, vector spaces, linear transformations, matrix/vector algebra, eigenvectors, Laplace Transform, and systems of equations.

LEARNING OUTCOMES: The successful student will be able to:

- *solve ordinary differential equations* that fall into one of the following two categories: (1) 1st-order (separable; linear; homogeneous) and (2) 2nd-order linear with constant coefficient (homogeneous; non-homogeneous with exponential, polynomial & sine/cosine right-hand sides)
- *solve systems of linear algebraic equations & systems of 1st-order linear differential equations*
- *use and identify vector space concepts*: subspaces, linear dependence/independence, bases and dimension
- *analyze linear transformations*: properties, kernel and range, determinants

GRADES: Course grades will be determined by five components: two midterms (25% each) and a final (30%), and weekly homework and quiz papers (10% each). Details on each component are provided later in this syllabus. Homework and quiz totals are graded on a standard 90A/80B/70C/60D scale; any deviations for exams will be announced after each exam is graded. Students are expected to keep track of their performance throughout the semester and seek guidance from available sources (including the instructor) if their performance drops below satisfactory levels.

Exams

There will be two in-class exams during the semester, and one final exam during the assigned final exam period. All exams will be closed-book and closed-notes, but students will be allowed to prepare and use a single 5"×7" card with notes written on both sides, as insurance against "mental blanks". No computers or calculators of any kind will be permitted. Exams will not be explicitly cumulative in nature, although the nature of the material means that later problems will inevitably draw on mathematical issues covered earlier in the course. *All* electronic devices must be turned off and stored during exams, to avoid distracting others. No leaving the room and returning, once exam papers are out. See also Policies on page 2.

Policies

Suggested plan of study: (1) *Before* class, read the sections assigned from the textbook to be discussed in class. Identify (write down) points of confusion and questions to ask. (2) *During* class, participate by bringing up questions from your reading and the lecture. Write notes actively, as the activity promotes retention. (3) *After* class: If necessary, watch a supplemental video (see Blackboard) for further explanation and examples (supplemental videos are *not* a replacement for attending lecture, and coverage will differ). Work assigned homework problems. If you get stuck, flag the problem and move on. Seek out the instructor, peers, or the Math Clinic for help *before* the next class. Bring homework problems (completed or not) to class for discussion. For any problem(s) you were initially unable to complete, work further problems of that type until you can complete them without difficulty. Review true-false questions at the end of each section.

Expectations for class time: This class meets every Monday and Wednesday (except spring break) from January 21 to May 8. Students are expected: to be on time, prepared and ready to work at 1:00; to have read the assigned section(s) from the text; to have tried the homework problems assigned over previous sections (bringing their work to class); not only to attend, but to actively participate in, class discussions, in order to maximize learning and help the instructor gauge the pace; to seek help (from the instructor, the Math Clinic, or others) on homework problems *before* the class session at which they are due. Class time will be available to address misconceptions and confusions common to many students in the class, but it is often not possible to devote time to going over every problem on which anyone had difficulty. As a sign of respect for your peers and our common work, please keep all phones, computers, and other electronic devices off during class. In emergencies cell phones may be set to vibrate only, and brief calls taken in the hallway outside.

Expectations for out-of-class study: The general rule for college courses is that for every hour spent in class, a student should spend 2 hours/week outside of class on the course (thus a 12–15-hour load is considered full-time: $12 \times 3 = 36$, $15 \times 3 = 45$). This includes time spent reading, studying, working on homework, consulting the instructor or tutors, etc. If you find that you regularly spend more than 6 hours per week outside class on this course, let me know. If you struggle to find 6 hours per week outside class to work on this course, you are officially overcommitted.

Late papers: Each student is allowed one late HW submission during the semester. The paper must be submitted before the beginning of the class period following that in which it was due. Papers not submitted by the end of class time on the due date are considered late. Submission of a late paper constitutes the student's agreement that this is the one allowed late assignment.

Electronic submissions: Each student is allowed one electronic submission during the semester (for homework only). An electronic submission must be **a single PDF** file, complete and not missing any details necessary for grading. (If the electronic submission is made late, then it is both the only late paper allowed and the only electronic submission allowed.)

Make-up exams: No make-up exams will be given regardless of reason, unless the student presents, *before* the exam, justification sufficient to convince the instructor to arrange one. Due to grade reporting deadlines, no make-up final exams will be given. No make-up quizzes will be given.

Course Attendance Policy: Class attendance has been shown to be directly correlated with students' grades in general. Although there is no explicit penalty for absences, students who miss class remain responsible for understanding the topics, vocabulary, techniques, and notation used in class (this will be as consistent with the text as possible). Absence does not excuse late homework papers or missed quizzes (homework may be turned in to the instructor's faculty mailbox at the math dept front desk or under his office door at any time). Students are also expected to make every effort to arrive on time (important announcements are often made at the beginning of class and not repeated), and to minimize disruption if they arrive late.

Everything else: Class policy on drops, withdrawals, academic honesty, grade grievances, and disabilities follows the University policy on these matters.

Homework

A tentative assignment sheet is given in the calendar at the end of this syllabus. These usually begin with simpler, straightforward exercises and progress to more challenging or complex questions. If you struggle with them, you may need to work further problems in order to master the topic.

Each *Monday* in class, the problems corresponding to the previous week's lectures are due. Papers will be graded primarily for completion (working all assigned problems and *showing work clearly*, regardless of correctness). Homework may be handwritten but must be legible, *with the work and reasoning clearly communicated*. Papers with ragged edges (from being torn out of a notebook and not trimmed) will not be accepted—they tangle with other papers. Staple or clip pages together (buy a mini stapler and keep it in your backpack if necessary).

Since homework is due on most of the semester's 15 weeks, each student's final homework grade will be determined by taking the top ten grades. This allows for occasional emergencies not to impact the grade. To be fair to all students, late homework will not be accepted for credit, although students are free to discuss homework problems with the instructor before or after their due dates. Students who have to miss class may submit (or fax) papers to the instructor's mailbox (4th floor PKH) *before* class. Papers cannot be submitted for grading via email more than once, as that would open the door to having to print every student's paper each week.

Quizzes

At the end of class each Wednesday (except when there's an exam), a short quiz will be given, with a single question based on material from the previous week of classes. No electronics are allowed for quizzes: they must be silenced and put away. There should be 12 during the semester; as with homework, only the top ten quiz grades will be used to determine this component of the grade.

Change to online format after spring break

As of March 16, due to the Covid-19 outbreak all UTA classes are moving online. Please:

1. Use the calendar in this syllabus to identify the topics/sections scheduled for each class.

2. Identify the video(s) in the Echo360 video bank which correspond to that topic/section. *Before 1:00pm on the given day*, watch one of those lecture videos. IMPORTANT NOTE: The lecture videos are 60–80 minutes long. Watching a pre-recorded video is not the same as attending a live lecture. You will need to pause between topics or examples, both to process the information and to take a break. People typically prefer watching 7–10 minutes at a time, so plan enough time to watch the entire video in several segments, rather than all at once.

3. As you watch the video, take notes. Mark places where you have questions, and pause the video while you write your questions down. Prepare your list of questions to ask.

4. If you have time before 1:00pm on the given day, try to work some homework problems and identify questions that you may have on them.

5. During our normal class time from 1:00 to 2:20, I will open up a Canvas Conference, like a live videoconference. You can access the Conferences page through the menu frame along the left side of our Canvas site. Any conferences (including past ones) will be listed and are clickable to enter or view. IMPORTANT NOTE: The conference will be like office hours or a review session, completely driven by student questions. It will NOT be a replacement for the lectures. (Students may ask questions specific to points in the lecture, or to particular problems or ideas, but not simply to summarize or repeat the entire lecture.) Students may pose questions by either text or audio. When you join the conference, please turn off your webcam and mute your microphone, and then if you wish to ask a question by audio, unmute your microphone only long enough to ask your question, and then mute it again. The reason for this is that the background noise from 75 microphones will overwhelm any actual speech. If at any time the noise becomes too loud, I will reserve the right to mute everyone.

6. I will create assignments in Canvas where students will be able to upload scans of their homework (by 2:30pm Mondays). Homework must be uploaded **as a single PDF** document (not one per page), so please learn how to convert scans or photos of your work to PDF. During this time I will not take quizzes for a grade, but will post to Canvas each Wednesday a quiz question (and, later, its answer) which you can use to gauge your understanding.

Calendar

A *tentative* schedule with topics is given below (subject to updating). As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course.

Date	Sec(s)	Topic(s)	Homework assignments
1/22	1.1,2	Intro to ODEs	1.1/3,5,9,25,29; 1.2/1,3,5,7,11, 15,23,25,29,33,35,39,43
1/27	1.4	Separable DEs	1,3,5,7,9,13,15,25
1/29	1.6	First-Order Linear DEs	1,3,5,7,9,15,17,19
2/03	1.8	Substitutions	9,13,39,41,43,51,55,59
2/05	2.1,2	Matrix Arith. & Properties	2.1/1,3,5,7,11,15,17,19,23,25,27,29,31; 2.2/1efgh,3cefg,5,11,13,15,19,32,33,35,41,43,47
2/10	2.3	Systems of Linear Equations	1,3,5,9,13,16,17,19,23
2/12	2.4	Elementary Row Operations	1,3,5,7,9,11,13,15,17,19,21,23,25
2/17	2.5	Gaussian Elimination	5,7,9,11,17,21,25,27,28,37,41
2/19	2.6	Inverse Matrices	1,3,5,9,11,21,25,27,29
2/24	—	catch-up/review	
2/26		**Exam 1**	
3/02	3.1,3	Determinants	3.1/19,21,23,25,27,35,45; 3.3/3,11,13,19,21,61,65
3/04	3.1,2	Properties of Determinants	3.2/3,5,9,17,19,21,23,25,33,35,39,43
3/09– 3/18		*extended spring break*	
3/23	7.1	Eigenvalues & Eigenvectors	1,5,13,14,15,17,21,22,23,25
3/25	7.1	Eigenvalues & Eigenvectors,	brief intro to vector spaces
3/30	4.4	Spanning Sets	3,5,7,9,13,17,19,23,33,35,37,40
4/01	4.5	Linear Independence	4.5/3,5,7,10,11,15,16,21,23,23,33,37,39; 9.2/3,5,8
4/06	4.6	Bases & Dimension	3,4,23,27,29,31,33,36,45
4/08		**Exam 2**	
4/13	8.1	Linear Higher-Order DEs	1,3,23,25,27,29,33,35,37,39,41
4/15	8.2	Const.Coeff.Homog.Lin. DEs	1,8,9,17,21,27,29,35
4/20	8.3	Undetermined Coefficients	25,27,31,33,35
4/22	8.7	Variation of Parameters	1,3,5,15
4/27	9.3,4	1st-Order Linear ODE Sys.	9.1/1,9; 9.3/3,5,7; 9.4/1,5,7,9,11,15,17
4/29	7.2,9.5	Defects & Gen'lized E'vecs	9.1/11; 9.5/1,3,5,7
5/04	9.6	Heterog. Sys. of ODEs	9.1/12,13; 9.6/3,9,11
5/06	—	catch-up/review	
5/15		**Exam 3**	
omit	*4.2,3*	*Vector Spaces & Subspaces*	*4.2/1,7,9,11,13; 4.3/1,3,5,9,13,15,17,19,21,28*
omit	*6.1*	*Linear Transformations*	*1,3,5,7,9,11,13*

I plan to offer an optional review session outside of class before each exam, consisting entirely of student-driven Q&A. Review sessions from past years are available on Echo360. Tentative schedule:

Fri Feb 21 1:00-2:00, Fri Apr 3 1:00-2:20, Fri May 8 1:00-2:20.

Resources

instructor • TA • Math Clinic drop-in help (PKH325) • Math Clinic open tutorial sessions • SI sessions • Blackboard course materials • Echo360 lecture videos • other videos • peer study groups

Institutional Policies

UTA students are encouraged to review the below institutional policies and informational sections and reach out to the specific office with any questions. To view this institutional information, please visit the Institutional Information page (http://www.uta.edu/provost/administrative-forms/course-syllabus/index.php) which includes the following policies among others:

- Drop Policy
- Disability Accommodations
- Title IX Policy
- Academic Integrity
- Student Feedback Survey
- Final Exam Schedule

Attendance:
At The University of Texas at Arlington, taking attendance is not required but attendance is a critical indicator of student success. Each faculty member is free to develop his or her own methods of evaluating students' academic performance, which includes establishing course-specific policies on attendance. However, while UT Arlington does not require instructors to take attendance in their courses, the U.S. Department of Education requires that the University have a mechanism in place to mark when Federal Student Aid recipients "begin attendance in a course." UT Arlington instructors will report when students begin attendance in a course as part of the final grading process. Specifically, when assigning a student a grade of F, faculty report must the last date a student attended their class based on evidence such as a test, participation in a class project or presentation, or an engagement online via Canvas. This date is reported to the Department of Education for federal financial aid recipients.

Emergency Exit Procedures:
Should we experience an emergency event that requires evacuation of the building, students should exit the room and move toward the nearest exit. When exiting the building during an emergency, do not take an elevator but use the stairwells instead. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

Student Success Programs:
UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring by appointment, drop-in tutoring, etutoring, supplemental instruction, mentoring (time management, study skills, etc.), success coaching, TRIO Student Support Services, and student success workshops. For additional information, please email resources@uta.edu, or view the Maverick Resources website.

Emergency Phone Numbers

In case of an on-campus emergency, call the UT Arlington Police Department at **817-272-3003** (non-campus phone), **2-3003** (campus phone). You may also dial 911. Non-emergency number 817-272-3381