Math 3319–004: Differential Equations & Linear Algebra
Fall 2018, PKH 105, Tue/Thu 12:30–1:50 PM

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Office Hours: after class, Thu 11am, and by appointment

Pre/corequisite: MATH 2326
Text materials: Goode & Annin, *Differential Equations and Linear Algebra*, **3rd** ed., Pearson, 2007.
Course home page: `http://mathed.uta.edu/kribs/3319.html`
Last day for withdrawal: November 2
Final exam: Tuesday, December 11, 11:00 AM–1:30 PM (note time)
Other exam dates (tentative): Thu Sep 27, Thu Nov 1, 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. 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.

Expectations for class time: This class meets every Tuesday and Thursday (except Thanksgiving Day) from August 28 to December 4. Students are expected: to be on time, prepared and ready to work at 12:30; 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 of thumb for college courses is that for every hour spent in class, a student should spend 2 hours per week outside of class working 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 are regularly spending 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.

Attendance: 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.

Late papers: Each student is allowed one late 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). Electronic submissions must be 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, sufficient justification to the instructor to convince him to make such arrangements. Due to grade reporting time constraints, no make-up final exams will be given. No make-up quizzes will be given.

Everything else: Class policy on drops, withdrawals, academic honesty, grade grievances, and disabilities follows the University policy on these matters. Copies can be obtained upon request.

Homework

A tentative assignment sheet (subject to updating) 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 *Tuesday* in class, the problems corresponding to the previous week's lectures are due. Papers will be graded primarily for completion (working all the assigned problems and *showing work clearly*, regardless of correctness—this recognizes effort). Homework may be handwritten but is expected to 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).

In addition, I ask students to attach (not staple) to the front of each assignment a post-it (one per week, *not* per section) with brief responses to the following three questions:

(1) What in the course worked best for you last week? (in or out of class)

(2) What worked least well for you? or what topics do you still struggle with?

(3) What question(s) would you like to see answered? (not specific homework problems, although you could ask for a particular type of example)

All three responses should be clearly so specific to the material from the previous week that they could not apply to any other week/section. Students may also pose broader questions about videos and other course materials. This is a way for me to get a better feel for how the course is going.

Since most of the 15 weeks of the semester will involve a homework assignment, 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 Thursday (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, and 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.

Service Learning Project

There may be an opportunity in the latter half of the semester to participate in a service learning project, a "math night" at a local K–8 school a mile from the UTA campus. This would involve a brief orientation session before the event, and at the event playing/facilitating some simple math card games with students and their parents, and helping parents understand the games' underlying mathematical/pedagogical motivation. If the event occurs, it will be confirmed in class in advance. In that case, students who participate and turn in a one-page reflection along with a time sheet signed by the school's principal (or by me) will receive one point per hour spent, toward homework or quiz grades (not to exceed the maximum 10-point score in either category).

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
8/23	1.1,2	Intro to ODEs	1.1/1,3,5,7,9,11; 1.2/1,3,5,9, 11,13,17,19,21,25,27,31,35,37,39
8/28	1.4	Separable DEs	1,3,5,7,15,25
8/30	1.6	First-Order Linear DEs	1,3,5,7,9,15,17,23
9/04	1.8	Substitutions	1,3,5,7,9,11,13,37,39,41
9/06	1.9	Exact DEs	1,3,5,7,11,13,15
9/11	2.1,2	Matrix Arith. & Properties	2.1/1,3,5,9,11,13,15,17,19,21,23,27; 2.2/1,3,7,9,11,13a,15,17,19,27,31,33,37,39,43
9/13	2.3	Systems of Linear Equations	1,3,7,9,11,13,15,17
9/18	2.4	Elementary Row Operations	1,3,5,9,11,15,19,21,25
9/20	2.5	Gaussian Elimination	1,3,5,7,13,17,21,33,37,41
9/25	2.6	Inverse Matrices	1,3,7,9,19,21,23,25
9/27		**Exam 1**	
10/02	3.1,3	Determinants	3.1/9,11,13,16,17,19,21; 3.3/15,41
10/04	3.1,2	Properties of Det.	3.2/1,3,9,15,19,21,23,25,27,29,37,39
10/09	5.6	Eigenvalues & Eigenvectors	1,3,9,11,13,15,17,21,23,25
10/11	4.2,3	Vector Spaces & Subspaces	4.2/1,3,5,7,9,11; 4.3/3,5,7,9,11,13,17,19,21
10/16	5.1	Linear Transformations	1,3,5,7,9,11,13
10/18	4.4	Spanning Sets	1,3,5,7,11,13,17,21,23,25
10/23	4.5	Linear Independence	4.5/1,3,5,7,13,15,19,21,29,31; 7.2/3,5,9
10/25	4.6	Bases & Dimension	3,5,7,13,15,17,21,23
10/30	4.7	Change of Basis	1,3,9,17,21,27
11/01		**Exam 2**	
11/06	6.1	Linear Higher-Order DEs	1a,3a,17,21,23,27,31,33,35,37
11/08	6.2	Const.Coeff.Homog.Lin. DEs	5,7,9,13,17,19,21,23,29,31,33
11/13	6.3	Undetermined Coefficients	17,19,26,31
11/15	6.7	Variation of Parameters	1,3,5,7
11/20	7.3,4	1st-Order Linear ODE Sys.	7.1/1,3,9,11,13; 7.3/1,3,5; 7.4/1,3,5,7,13,15,17
11/27	5.7,7.5	Defects & Gen'lized E'vecs	7.5/1,3,5,7
11/29	7.6	Heterog. Sys. of ODEs	1,3,7
12/04	8.1,2,4	Laplace Transforms	8.4/1,3,5,7
12/11		**Exam 3**	

I tentatively expect to offer an optional review session outside of class before each exam. These sessions will consist entirely of Q&A where students bring questions and I respond. I hope to have these sessions videotaped and put on Blackboard before the exam so that students unable to attend can still benefit. Tentative dates/times, very subject to updating:

Wed Sep 26 12:00-12:50, Wed Oct 31 12:00-12:50, Thu Dec 6 12:30-1:30.

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

University Policies

Attendance: At The University of Texas at Arlington, taking attendance is not required but attendance is a critical indicator in 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. See the course-specific policy in the syllabus. 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 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 Blackboard. This date is reported to the Department of Education for federal financial aid recipients.

Drop Policy: Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance**. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (http://wweb.uta.edu/aao/fao).

Disability Accommodations: UT Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including *The Americans with Disabilities Act (ADA), The Americans with Disabilities Amendments Act (ADAAA),* and *Section 504 of the Rehabilitation Act.* All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of disability. Students are responsible for providing the instructor with official notification in the form of **a letter certified** by the Office for Students with Disabilities (OSD). Only those students who have officially documented a need for an accommodation will have their request honored. Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting: **The Office for Students with Disabilities, (OSD)** www.uta.edu/disability or calling 817-272-3364. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability. **Counseling and Psychological Services, (CAPS)** www.uta.edu/caps/ or calling 817-272-3671 is also available to all students to help increase their understanding of personal issues, address mental and behavioral health problems and make positive changes in their lives.

Non-Discrimination Policy: The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit uta.edu/eos.

Title IX: The University of Texas at Arlington ("University") is committed to maintaining a learning and working environment that is free from discrimination based on sex in accordance with Title IX of the Higher Education Amendments of 1972 (Title IX), which prohibits discrimination on the basis of sex in educational programs or activities; Title VII of the Civil Rights Act of 1964 (Title VII), which prohibits sex discrimination in employment; and the Campus Sexual Violence Elimination Act (SaVE Act). Sexual misconduct is a form of sex discrimination and will not be tolerated. *For information regarding Title IX, visit* www.uta.edu/titleIX or contact Ms. Michelle Willbanks, Title IX Coordinator at (817) 272-4585 or titleix@uta.edu.

Academic Integrity: Students enrolled in this course are expected to adhere to the UT Arlington Honor Code:

> *I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence. I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.*

UT Arlington faculty members may employ the Honor Code in their courses by having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents' Rule* 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University. Additional information is available at https://www.uta.edu/conduct/. Faculty are encouraged to discuss plagiarism and share the following library tutorials http://libguides.uta.edu/copyright/plagiarism and http://library.uta.edu/plagiarism/. *Papers involving plagiarism will receive an indelible grade of zero.*

Electronic Communication: UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at http://www.uta.edu/oit/cs/email/mavmail.php.

To obtain your NetID or for logon assistance, visit https://webapps.uta.edu/oit/selfservice/. If you are unable to resolve your issue from the Self-Service website, contact the Helpdesk at helpdesk@uta.edu or (817)272-2208.

Campus Carry: Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. Under the new law, openly carrying handguns is not allowed on college campuses. For more information, visit http://www.uta.edu/news/info/campus-carry/

Student Feedback Survey: At the end of each term, students enrolled in face-to-face and online classes categorized as "lecture," "seminar," or "laboratory" are directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback via the SFS database is aggregated with that of other students enrolled in the course. Students' anonymity will be protected to the extent that the law allows. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law and aggregate results are posted online. Data from SFS is also used for faculty and program evaluations. For more information, visit http://www.uta.edu/sfs.

Final Review Week: For semester-long courses, a period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

Grade Grievances: Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current graduate catalog.

Emergency Exit Procedures: Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and make arrangements to assist individuals with disabilities.

Student Support Services: UTA 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, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at http://www.uta.edu/studentsuccess/success-programs/programs/resource-hotline.php.

The IDEAS Center (2nd Floor of Central Library) offers free tutoring to all students with a focus on transfer students, sophomores, veterans and others undergoing a transition to UT Arlington. Students can drop in, check the schedule of available peer tutors at www.uta.edu/IDEAS, or call (817) 272-6593.

Active Shooter/Threat Resources: https://police.uta.edu/crime-prevention/active-shooter-resources.php

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