
Meetings: MTWF 6 - 6:50 PM in LCB 219

Instructor: Leo Herr

Email address: herr@math.utah.edu

Online Office hours: Monday and Wednesday 5-5:50, with a third TBD by vote, or by appointment. See Canvas for Zoom info.

Text: *Linear Algebra and Its Applications*, Lay, Lay, and McDonald (5th edition).

For information about purchasing the textbook, visit math.utah.edu/resources/bookinfo.php

Course information: Math 2270, Linear Algebra, is a 4 credit course.

Prerequisite information:

- **C** or better in ((MATH 1260 OR MATH 1320 OR MATH 1321 OR MATH 2210) OR (MATH 1220 AND Full Major status in Computer Science OR Computer Engineering OR Data Science))
- OR **B** or better in MATH 1220

Course description: Euclidean space, linear systems, Gaussian elimination, determinants, inverses, vector spaces, linear transformations, quadratic forms, least squares and linear programming, eigenvalues and eigenvectors, diagonalization. Includes theoretical and computer lab components.

Canvas and Zoom: All homework will be posted and collected on Canvas. All student grades will be stored and calculated on Canvas. In addition, I will frequently post additional information and announcements on Canvas. Please check frequently for this information. You are welcome to use the Canvas discussion board to discuss problems and concepts from class.

If social distancing guidelines change, we may change to a Zoom lecture format.

Online submission: *Solutions to all homework assignments will be submitted online via Canvas.* You will be required to upload a pdf of your solutions. I recommend writing your solutions on paper and scanning your written homework with the (free) app “Genius scan” for Android or the (free) app “Scannable” for iOS devices. However, you are free to use any device and any program to capture your solutions and upload them. You can and will be docked points for illegibility.

Your solutions should be written in plain English with mathematical notation and must be neatly presented and easy to read. You will be graded on the mathematical and logical coherence of your arguments. *Please check your pdf file after uploading it* to make sure that it is readable. Unreadable pdfs may not be graded.

Grading: The following are the grade components and the percentage each contributes to a student’s final grade:

- **Homework Assignments (25%)**- Roughly three textbook sections are due most Fridays at the beginning of class (including days of exams, but not the week following). The homework will typically cover material covered up to and including the preceding Monday. Three of the problems will be selected for grading by the grader, each graded out of 5 points. There will also be 5 points given for completion. The lowest homework score will be dropped. Homework will only be accepted in class, no electronic copies. Late homework is, in general, not accepted.
- **Quizzes (10%)**- Quizzes will be given to ensure proficiency in the material covered. They may take several forms, including in-class or at-home quizzes and group projects.
- **Midterm Exams (40%, 20% each)**- Two 50-minute midterm exams will be given. You will have the whole class period to complete the exam. Dates of the midterm exams will be **Friday, October 8th and Friday, November 19th**.
- **Final Exam (25%)**- A two-hour comprehensive exam will be given. As with the midterms, a practice final will be posted a week prior.

Final Exam: Friday, December 13th, 6:00 – 8:00 pm

Final letter grades will be decided *approximately* according to the standard ranges (90% for an A, 80% for a B, etc.). If necessary, the instructor may revise the grade ranges so that a *lower numerical* grade will result in a *higher letter* grade.

Resources:

- **Office hours:** Office hours are a great chance for students to get help with homework problems and to deepen their understanding of concepts from class. I encourage you to attend them. See Canvas for the meeting times and meeting IDs.
- **Anonymous Question Form:** Some students are too shy to ask their questions. Please use this Google form on canvas for asking me anything at any time. It is also a way to give me anonymous feedback.
- **Tutoring center and computer lab:** There is free tutoring in the T. Benny Rushing Mathematics Student Center (room 155C), as well as a computer lab. Presently, tutoring is being conducted in person. They may offer online options as well in the near future. See their website, math.utah.edu/undergraduate/mathcenter.php for updates and further information.
- **The Learning Center:** The Learning Center offers private tutoring sessions. The first three sessions are free, while further sessions will incur a small fee. See learningcenter.utah.edu for more information.

Expected learning outcomes: Upon successful completion of this course, a student should be able to complete tasks in the following areas:

1. Row reduction — use row reduction to solve linear systems of equations; apply this to compute bases of vector spaces, kernels of linear transformations, and inverses of matrices.
2. Matrices — compute matrix representatives of linear transformations; perform computations with matrices including products, determinants, eigenvalues, eigenvectors, and inverses; understand and apply changes of bases; understand the geometry of matrices as linear transformations.
3. Abstract vector spaces — prove basic facts about abstract vector spaces and linear transformations; compute bases and dimensions of vector spaces; understand intersections of subspaces and their dimensions.
4. Geometry of Euclidean space — compute inner products and orthogonal projections; construct orthonormal bases using the Gram-Schmidt process.
5. Quadratic forms — understand the spectral theorem and diagonalization for symmetric matrices; compute quadratic forms and their properties.

Class attendance: Given the nature of this course, attendance is required and adjustments cannot be granted to allow non-attendance. However, if you need to seek an ADA accommodation to request an exception to this attendance policy due to a disability, please contact the *Center for Disability and Access (CDA)*. CDA will work with us to determine what, if any, ADA accommodations are reasonable and appropriate.

Student responsibilities: All students are expected to maintain professional behavior in the classroom setting, according to the Student Code, spelled out in the Student Handbook. Students have specific rights in the classroom as detailed in Article III of the Code. The Code also specifies proscribed conduct (Article XI) that involves cheating on tests, plagiarism, and/or collusion, as well as fraud, theft, etc. Students should read the Code carefully and know they are responsible for the content. According to Faculty Rules and Regulations, it is the faculty responsibility to enforce responsible classroom behaviors, and I will do so, beginning with verbal warnings and progressing to dismissal from class and a failing grade. Students

have the right to appeal such actions to the Student Behavior Committee. See regulations.utah.edu/academics/6-400.php

ADA statement: The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability & Access, 162 Olpin Union Building, 801-581-5020. CDA will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in alternative format with prior notification to the Center for Disability & Access.

Addressing sexual misconduct: Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).

Campus safety: The University of Utah values the safety of all campus community members. To report suspicious activity or to request a courtesy escort, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit safeu.utah.edu

Student names and personal pronouns: Class rosters are provided to the instructor with the student's legal name as well as preferred first name (if previously entered by you in the Student Profile section of your CIS account). While CIS refers to this as merely a preference, I will honor you by referring to you with the name and pronoun that feels best for you in class and on exams, homework, etc. Please advise me of any name or pronoun changes (and update CIS) so I can help create a learning environment in which you, your name, and your pronoun will be respected. If you need assistance getting your preferred name on your UID card, please visit the LGBT Resource Center Room 409 in the Olpin Union Building, or email bpeacock@sa.utah.edu to schedule a time to drop by. The LGBT Resource Center hours are M-F 8am-5pm, and 8am-6pm on Tuesdays.

Wellness statement: Personal concerns such as stress, anxiety, relationship difficulties, depression, cross-cultural differences, etc., can interfere with a student's ability to succeed and thrive at the University of Utah. For helpful resources contact the Center for Student Wellness at wellness.utah.edu or 801-581-7776.

COVID-19 Considerations: Students must self-report if they test positive for COVID-19 via coronavirus.utah.edu

University leadership has urged all faculty, students, and staff to model the vaccination, testing, and masking behaviors we want to see in our campus community. These include:

- Vaccination
- Masking indoors
- If unvaccinated, getting weekly asymptomatic coronavirus testing
- Vaccination
 - Get a COVID-19 vaccination if you have not already done so. Vaccination is proving highly effective in preventing severe COVID-19 symptoms, hospitalization and death from coronavirus. Vaccination is the single best way to stop this COVID resurgence in its tracks.
 - Many in the campus community already have gotten vaccinated:
 - * More than 80% of U. employees
 - * Over 70% of U. students
 - Visit mychart.med.utah.edu/, alert.utah.edu/covid/vaccine, or vaccines.gov/ to schedule your vaccination.
- Masking
 - While masks are no longer required outside of Health Sciences facilities, UTA buses and campus shuttles, CDC guidelines now call for everyone to wear face masks indoors.
 - * Check the CDC website periodically for masking updates — cdc.gov/coronavirus/2019-ncov/vaccines/fully-vaccinated-guidance.html
 - * Treat masks like seasonal clothing (i.e. during community surges in COVID transmission, masks are strongly encouraged indoors and in close groups outside).
- Testing
 - If you are not yet vaccinated, get weekly asymptomatic coronavirus tests. This is a helpful way to protect yourself and those around you because asymptomatic individuals can unknowingly spread the coronavirus to others.
 - Asymptomatic testing centers are open and convenient:
 - * Online scheduling Saliva test (no nasal swabs)
 - * Free to all students returning to campus (required for students in University housing)
 - * Results often within 24 hours
 - * Visit alert.utah.edu/covid/testing
 - Remember: Students must self-report if they test positive for COVID-19 via this website: coronavirus.utah.edu/.
- Student Mental Health Resources
 - Rates of burnout, anxiety, depression, isolation, and loneliness have noticeably increased during the pandemic. If you need help, reach out for campus mental health resources, including counseling, trainings and other support.
 - Consider participating in a Mental Health First Aid or other wellness-themed training provided by our Center for Student Wellness and sharing these opportunities with your peers, teaching assistants and department colleagues.

RECOGNITION of POLICIES AND DATES
Fill out, sign and date and bring to class

YOUR NAME: _____

SECTION: _____

I acknowledge that I have been informed that the midterm exams are scheduled for:

Midterm 1: Friday, October 8th.

Midterm 2: Friday, November 19th.

I have no schedule conflicts and can attend all of these exams.

Furthermore, I acknowledge that I have been informed that the final exam is scheduled for

Friday, December 13th, 6:00 – 8:00 pm.

I have no schedule conflicts and can attend the final exam.

I have read and I understand the syllabus. I understand the system that will be used to evaluate my work in this course.

SIGN: _____

DATE: _____