MATH 2270 Linear Algebra, Summer 2020

Class Meetings: This is an online class through the canvas.
Instructor: Seungsu Lee, Ph. D candidate in mathematics.
Email: slee@math.utah.edu
Virtual Office Hours (via Zoom): Wednesday and Friday 9:00 a.m - 10:00 a.m.

Course Information: Math 2270 Linear Algebra is a 4 credit course.
Prerequisite Information: "C" or better in ((MATH 2210 OR MATH 1260 OR MATH 1320 OR MATH 1321) OR (MATH 1220 AND Full Major status in Computer Science OR Computer Engineering OR Data Science)).
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.

Text:

- *Linear Algebra and its Applications*, 5th edition, by David C. Lay. ISBN=032198238X.

Canvas: Canvas will be used for posting course announcements, lecture videos, homework assignments, grades, files and any relevant supplementary material. You are also welcome to make use if the Canvas discussion board to discuss course problems or topics. You can access the Canvas page through CIS or by logging in at **utah.instructure.com**. Students should check the Canvas page regularly for course information and resources. Email notifications and correspondence will be sent to the student's UMail address ([u-number]@utah.edu); this email account must be checked regularly.

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

- **Online Quizzes (10%)**- There will be 30 to 40-minute quizzes on Canvas that open every Thursday morning at 9:00 a.m. and close the same class day by 11:59 p.m, including exam weeks. You will need to complete that online quiz on your time every week. Each quiz will be one to four questions about the material covered in class/video lecture that week. If you are keeping up with the work, these quizzes should be reasonably straight forward. There will be a total of about 10-11 of these quizzes. I will drop the lowest two scores.
- **Weekly Assignments (20%)**- There will be a total of 9 weekly assignments, posted on Canvas on Monday morning of each non-test week and due the following Monday nights, by 11:59 p.m. To turn in the homework, you have to scan the assignment and upload it to Canvas. The weekly assignment will cover the material presented that week in class, that is it will cover the sections covered Monday through Friday class sessions. I will drop your lowest two assignment scores.

  Please take note:

  1. Each student will be allowed to turn in only one late assignments per semester, regardless of the reason.
  2. The late assignments will be directly uploaded to Canvas and must be turned in by 11:59 pm on the next day the assignment is originally due.
  3. After you have used up your late assignment, there will be no further late assignments accepted, under any circumstances. Absolutely no exceptions. I will be consistently strict (and thereby fair) about this policy.

- **Midterm Exams (40%)**- Two 60-minute midterm exams will be given on selected days. The exam will be proctored through Zoom embedded in Canvas. **You are required to have access to webcam and microphone.**
  - 1st midterm: Friday, June 19th, 7:00 p.m. - 8:00 p.m.
  - 2nd midterm: Friday, July 10th, 7:00 p.m. - 8:00 p.m.
- **Final Exam (30%)**- A two-hour comprehensive exam will be given.
  - Final Exam: Thursday, July 30th 6:00 p.m - 8:00 p.m

Students with university excused absences (band, debate, student government, intercollegiate athletics) should make alternate arrangements with me as soon as possible if the absence interferes with any course components.

Cheating: If you cheat on any assignment, I will give you a zero on that assignment. Depending on the severity of the cheating, I may decide to fail you from the class. In all cases of academic dishonesty, I will report the incident to the Dean of Students.

Calculators: Calculators will not be allowed on exams. They may be used on homework, but you should still write out the details of your computation. It is in your best interest not to become too dependent on your calculator since they will not be allowed on exams.

Final course letter grades will be determined as follows: If X is your course percentage weighted according to the above, then $\{X \geq 93\% \Rightarrow A, X \geq 90\% \Rightarrow A-, X \geq 87\% \Rightarrow B+, X \geq 83\% \Rightarrow B\ , X \geq 80\% \Rightarrow B-\ , X \geq 77\% \Rightarrow C+\ , X \geq 73\% \Rightarrow C, X \geq 70\% \Rightarrow C-\ , X \geq 67\% \Rightarrow D+\ , X \geq 63\% \Rightarrow D\ , X \geq 60\% \Rightarrow D-\ , X < 60\% \Rightarrow E\}$.
The instructor retains the right to modify this grading scheme during the course of the semester; students will, of course, be well notified of any adjustments.

Additional Resources

- **Tutoring Center & Computer Lab**- There is free tutoring in the T. Benny Rushing Mathematics Student Center (room 155, the lower level between JWB and LCB), as well as a computer lab. For more information see http://www.math.utah.edu/undergrad/mathcenter.php
- **Private Tutoring**- University Tutoring Services, 330 SSB. There is also a list of tutors at the math department office JWB 233.
- **Departmental Videos**- The math department has a full set of lecture videos which you are welcome to use to supplement our course material. These can be found at http://www.math.utah.edu/lectures/

Expected Learning Outcomes: Upon successful completion of this course, a student should be able to:

1. be able to solve linear systems/equations concretely using vectors and matrices
2. be able to understand these linear systems and their solutions geometrically in terms of vector spaces. In particular, you should understand how matrices can represent linear transformations.
3. understand general properties of vector spaces, examples of vector spaces, how to recognise when something is a vector space, and how to compare different vector spaces. In particular understand the vector space $\mathbb{R}^n$.
4. understand the notion of subspace of a vector space, and use this to think about solutions to linear systems.

5. find bases and compute dimensions of vector spaces and connect this conceptually with the notion of rank.
6. understand what is a coordinate system, how to change coordinates, what this means abstractly (for vector spaces) and concretely (for vectors and matrices).
7. perform matrix computations (like row reduction) and understand the context and use of these computations in linear algebra.
8. more specifically: you will be able to put matrices into echelon form, and be able to use this along with several theorems regarding span, linear independence and rank.
9. calculate products of matrices and think about these in the context of linear transformations.
10. understand various ways to decide when a matrix is invertible—for example with determinants—and be able to invert matrices. and link these concepts to existence and uniqueness of solutions.
11. find eigenvectors, and eigenvalues and understand what these mean geometrically, for vector spaces linear transformations.
12. understand orthogonal projections and Gram-Schmidt orthogonalization.

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 and class and a failing grade. Students have the right to appeal such action to the Student Behavior Committee. http://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, veterans 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).

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, on papers, exams, group projects, 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 UIDcard, 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 www.wellness.utah.edu or 801-581-7776.

Additional Policies: Due to experience, I have decided to make some additional policies regarding my classroom administration and grading.

- I do not allow the use of laptop computers (where the screen is perpendicular to the desk) in my classroom, in order to minimize student distractions. At this point, it's almost impossible to type notes for a math class on a laptop in real time. Thus, it is unnecessary in class. If you are using a tablet or ipad or some similar device to take notes and the screen lies parallel to your desk, that is totally fine.
- There will be no retakes of exams, for any reason.
- If you have an emergent, extenuating circumstance that makes it necessary to take an alternate exam, it is your responsibility to discuss that with me, before the exam occurs, or as soon as possible. In general, I allow exams to be taken early, but not late.
- No cursing nor negative ranting (for example, "math sucks") on any written work turned in, as it's unprofessional behavior. The penalty for such things on your written work will be a zero score on that assignment or test.
- I will regularly post announcements to the class in Canvas and will hold you accountable for receiving that information. Be sure to turn on your notifications in Canvas so you are alerted to announcements I make in Canvas as well as grade changes, discussion posts, etc.
- If you have questions about any exam/assignment grade, or you want to appeal the grading of the exam/assignment, you must turn it in to me (either on paper or in Gradescope depending on how the assignment/exam was graded) within one week of the exam/assignment being turned back in class. I'm happy to look over your appeal and/or questions and give my feedback in order to benefit your learning. But, it must be done in this time frame of a week from when I hand back the exam/assignment.
- If you cheat on any homework, project, quiz or exam, I will automatically give you a zero for that grade. Depending on the severity of the cheating, I may decide to fail you from the class. Please note that the use (or even just pulling it out of your pocket) of a cell phone or any other electronic device during any in-class exam is considered cheating and cause for receiving an automatic zero. Also, if you exhibit any other behaviors that are unethical, like offering me a bribe to give you a better grade (even if you later claim you were joking), I will report your behavior to the Dean of Students.

I reserve the right to change my policies stated in this syllabus at some point in the semester. If I do make a change to a policy, I will announce it in class and post an Announcement on Canvas about it.