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Math 2270 – 2   Linear Algebra  (Tentative Syllabus)          March 3, 2021
                Fall 2020


Credit Hours:   Four

Meeting Time:   M, T, W, F  8:35 – 9:25 am  – – –  IVC
                Lectures will be delivered synchronously via ZOOM. Students are
                expected to participate in the remote lectures as they would
                classroom lectures. Attendance will be taken. Recordings of our
                ZOOM meetings will be available via CANVAS.


Zoom:           Details at the "Syllabus" tab in the class canvas page.

Homepage:       http://www.math.utah.edu/~treiberg/M2274.html


Instructor:     Prof. A. Treibergs (he/him/his)
                Campus Office: JWB 224, 581 – 8350.
                Office Hours: MTF 11:50 AM – 12:55 PM
                I will be teaching from home and will answer questions by email
                or ZOOM. I will answer emails in turn as they come in during
                office hours, and will reply to emails between 9-6 by the next
                business day. I read mail sent to the canvas Inbox and the
                following address. I do not read emails sent to any other address.

E-mail:         treiberg@math.utah.edu

Text:           David C. Lay, Stephen R. Lay & Judi McDonald, Linear Algebra and
                its Applications, 5th. ed., Pearson, 2015.
                ISBN-13: 978-0321982384;   ISBN-10: 032198238X
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A. COURSE DESCRIPTION

Four credits. Prerequisites: 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)). Designated Quantitative Reasoning (Math
& Stat/Logic)

B. COURSE DETAILS

➢   Course Type:
   Interactive Video Conferencing (IVC – synchronous online).
➢   Location & Meeting Times:
   M, T, W, F 8:35 – 9:25 am – – – IVC Lectures will be delivered
   synchronously via ZOOM. Students are expected to participate in the
   remote lectures as they would classroom lectures. Recordings of our
   ZOOM meetings will be available via CANVAS.

➢   Attendance & Punctuality:
   It is strongly recommended that students join the synchronous Zoom
   sessions at the scheduled class time. Exams will take place during these
   times. Since we will strive to encourage class discussion, is a matter
   of courtesy to be on time and to log into Zoom for class with audio and
   video enabled.

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

➢   Instructional Support Team:
   We expect to have a homework reader for this class. Details will be
   provided when available.

➢   Course Materials:
   Textbook: David C. Lay, Stephen R. Lay & Judi McDonald, Linear Algebra
   and its Applications, 5th. ed., Pearson, 2015. ISBN-13: 978-0321982384;
   ISBN-10: 032198238X. Available to rent or buy as Kindle, hardcover or
   paperback. Students may purchase another edition, but the student is
   responsible for solving the correct homework problems, which will be
   assigned from the 5th edition. Course materials other than the textbook
   will be available on line at the course webpage and in canvas.

➢   Technical requirements:

   Students are expected to be computer literate and Canvas and zoom
   navigation skills are expected. Knowledge and navigation of canvas and
   zoom is critical to access all features and resources of this course.
   It is expected that students log into Zoom for class with audio and
   video enabled.

   A strong internet connection and adequate bandwidth is needed.

   Exams will be taken in canvas at the scheduled times.

   Additional software/computing requirements: students will be asked to
   solve linear equations numerically. It does not matter which software is
   used, but students should start to familiarize themselves with software.
   e.g., Maple and R both support linear algebra.

   For technical assistance, review the Canvas Getting Started Guide for
   Students and/or contact TLT, Knowledge Commons.

➢   Syllabus subject to change:
   This syllabus is meant to serve as an outline and guide for our course.
   Please note that I may modify it with reasonable notice to you. I may
   also modify the Course Schedule to accommodate the needs of our class.
   Any changes will be announced in class and posted on Canvas.

C. CONTENT OVERVIEW

Topics include Euclidean space, linear systems, Gaussian elimination, determinants, inverses, vector spaces, linear transformations, quadratic forms, least squares and linear programming, eigenvalues and eigenvectors, diagonalization. Course includes theoretical and computer components.

      Chapters
              Linear Equations.
              Matrix Algebra.
              Determinants.
              Vector Spaces
              Eigenvalues & Eigenvectors
              Orthogonality and Least Squares
              Symmetric Matrices & Quadratic Forms.

D. COURSE EXPECTED LEARNING OUTCOMES

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

1. Understand the mathematical notation and geometric interpretation of linear systems, and make connections between the two.

   Understand the connection between Ax and a linear combination of vectors.

   View Ax as linear transformations, and classify it as onto or one-to-one.

   Understand the properties of vector spaces, in particular Rn

2. Perform matrix computations and understand them as examples of abstract mathematical concepts.

   Perform row reductions and put matrices into echelon forms. Relate echelon form to span, linear independence, determinant, invertibility, and rank.

   Calculate matrix-vector and matrix-matrix products and think about these processes in the context of linear transformations.

   Find determinants, eigenvectors, and eigenvalues and link these concepts to existence and uniqueness of solutions.

   Use eigenvalues and eigenvectors to find properties of transformations.

   Compute dimension and bases of vector spaces.

   Handle change of coordinate systems for linear transformations.

3. Recognize applications and interpretations of linear algebra concepts.

   Develop approximations using orthogonal projection and Gram-Schmidt orthogonalization.

   Do singular value decomposition in image processing and eigenvectors in the Google page rank algorithm.

4. Gain professionalism.

   Collaborate, analyze and address mathematical problems with colleagues.

Articulate and discuss mathematical ideas via written and oral expression.

Engage in diverse problem-solving with other classmates.

E. COURSE DESIGN

Material will be presented in lectures and read from the text and internet sources. This course will use instructor driven online lectures that will be delivered via Zoom video conferencing on canvas during class times. Any supplementary materials will also be made available in canvas at least by 5:00pm the day before lecture. Significant time will be devoted to working homework problems in class. Students should read the section in the text before each class.

All exams for this course will also be held during class time via canvas. Students will solidify their learning by solving problems assigned weekly. Students will upload their homework as pdf files to canvas.

F. EVALUATION METHODS AND GRADING

Homework: To be assigned weekly. Tentatively, homework will be due Fridays
               at 4:00 PM and will be submitted as file uploads via CANVAS.
               Homework that is one week late or less will receive half credit.
               Homework that is more than one week late will receive no credit.

   Exams: Exams will be Quizzes taken via CANVAS during class time.

Midterms: There will be four in-class one-hour midterm exams
               on Wednesdays Feb. 3, Feb 24, Mar. 17 and Apr. 7.

Final Exam: Fri., Apr. 30, 8:00 – 10:00 AM, the University scheduled time.
               Half of the final will be devoted to material covered after
               the fourth midterm exam. The other half will be comprehensive.
               Students must take the final to pass the course.

Course grade: Best three of four midterms 42% + HW 37% + final 21%. Grades will
              be assigned by the following cutoffs, based on previous classes.
              If percentage of total score is at least P then grade will be

                    P   Grade
                    ---   -----
                    90%   A
                    86&   A–
                    83%   B+
                    79%   B
                    75%   B–
                    69%   C+
                    50%   C
                    45%   C–
                    40%   D+
                    32%   D

G. CLASS SCHEDULE & IMPORTANT DATES

Class meets at M, T, W, F from 8:35 – 9:5 am via synchronous ZOOM meetings
(IVC) starting January 19 and ending April 27.

Last day to register is Jan.22. Last day to drop class is Jan.29. Until Mar.12 you can withdraw from class with no approval at all. After that date you must petition your dean's office to be allowed to withdraw. Please check the academic calendar for more information pertaining to dropping and withdrawing from a course. Withdrawing from a course and other matters of registration are the student's responsibility.

Exam Dates: There will be four in-class one-hour midterm exams on Wednesdays Feb. 3, Feb. 24, Mar. 17 and Apr. 7. The final exam is Fri., Apr. 30, 8:00 – 10:00 AM. The final is at the University scheduled time.

Holidays: There will be no classes on Monday, Feb.15 (Presidents Day), Mar.5 and Apr.5 (Non Instruction Days). Spring break has been cancelled due to CoViD 19.

H. COMMUNICATION

Communication and responsibilities you expected from students.

• The course syllabus, homework, and supplementary material such as old and solved exams will be posted on the class website

http://www.math.utah.edu/~treiberg/M2274.html

The syllabus, homework assignments will also be posted on the class canvas page. Other sensitive materials such as grades and recordings of our meetings will also be available on the course canvas page for Math 2070-002 Spring 2021

https://utah.instructure.com/courses/657215

Class announcements will be done via email through the University server. You will be responsible for any information contained in them as well as the information announced in class.

• It is your responsibility to also regularly check your Umail (make sure you set up forwarding if you do not check it regularly). Your Umail is the only way for me to communicate privately with you. There will be occasions during the semester that we may need to reach out to you individually (e.g. regarding a grade or assignment) and it is in your best interest to respond promptly.

• Feel free to contact me for questions via the canvas Inbox or by email at

treiberg@math.utah.edu

This is the only email address I respond to. I will do my best to answer emails promptly. I would like to encourage you to email me only if it is something personal that requires individual attention. If instead you have questions about logistics of the class, course material and assignments, and anything else your classmates may wonder as well, please post a question on the Discussions Board instead. This way the information is shared quickly to the entire class, and each of you can benefit from seeing other classmates' questions. Generally, I do not read any comments posted with your assignments.

• I will always do my best to ensure the communication relevant to the course is clear and transparent. It is your responsibility as well to keep yourself updated by regularly checking: the assignments, modules and announcements on Canvas, your Umail, the posts on the Discussions Board, and pay attention to

the announcements given in class.

• Course Canvas Page: Students are expected to log in and check canvas regularly for posted announcements and assignments. Students are also strongly advised to set up notifications for canvas so they do not miss any important messages.

I. NETIQUETTE – EXPECTATIONS FOR ONLINE LEARNING ENVIRONMENT

Here are some norms of communications for online settings.

• Classroom equivalency: Respectful participation in all aspects of the course will make our time together productive and engaging. Zoom lectures, discussion threads, emails and canvas are all considered equivalent to classrooms and student behavior within those environments shall conform to the student code. Specifically:

○   Posting photos or comments that would be off-topic in a classroom are still off-topic in an online posting.
○   Disrespectful language and photos are never appropriate.
○   Using angry or abusive language is not acceptable, and will be dealt with according to the Student Code. The instructor may remove online postings that are inappropriate.
○   Do not use ALL CAPS, except for titles, or overuse certain punctuation marks such as exclamation points and question marks.
○   Course e-mails, e-journals, and other online course communications are part of the classroom and as such, are University property and subject to the Student Code. Privacy regarding these communications between correspondents must not be assumed and should be mutually agreed upon in advance, in writing.

• Other expectations for online communication (on Discussion Board, Emails, Zoom, chat, etc.:

○   Emails: When emailing your Instructor and Teaching Team keep a professional tone (e.g. Use a descriptive subject line, avoid "Hey" and always use your professors' proper title: Dr. or Prof., Sign your message with your name and return e-mail address. Please consult this page for tips on how to write appropriate professional emails: https://academicpositions.com/career-advice/how-to-email-a-professor
○   Treat your instructor, teaching team and classmates with respect in email or any other communication.
○   Remember that all college level communication should have correct spelling and grammar (this includes discussion boards).
○   Avoid slang terms such as "wassup?" and texting abbreviations such as "u" instead of "you."
○   Be cautious when using humor or sarcasm as tone is sometimes lost in an email or discussion post and your message might be taken seriously or be offensive to others.
○   Be careful with personal information (both yours and others).

• Electronic or equipment failure: It is your responsibility to maintain your computer and related equipment in order to participate in the online portion of the course. Equipment failures will not be an acceptable excuse for late or absent assignments.

• Online submissions: You are responsible for submitting the assignment with the required naming convention, correct file extension, and using the software type and version required for the assignment. Homework will normally be submitted as

a single pdf file. The file name should be your name and assignment number, e.g., "Einstein_HW6.pdf" and not "math homework.pdf".

• Canvas allows students to change the name that is displayed AND allows them to add their pronouns to their Canvas name. Additionally, students can indicate their pronouns in Zoom. Using your own name, however, will help me recognize you.

J. ASSIGNMENTS, ASSESSMENT & GRADING

Here are some details about course grading.

• The total score is the weighted sum of the best three of four midterms, the homework and the final. The best of three midterms will be weighted 42%, the homework 36% and the final final 21%. Grades will be assigned by the scale above, which is based on my experience of previous classes. If percentage of total score is at least P then grade will be as in the table. For example, if a student gets 80% on midterms, 95% on homework and 68% on final then her weighted total will be (.42)(.80)+(.37)(.95)+(.21)(.68) = .8303 which earns her the grade B+. Canvas provides running percentages from each section. These should be regarded as approximate indicators of your performance.

• The midterms and final will consist of canvas quizzes. Students will upload a pdf file for each part of the exam. Students should be familiar with the technology of making pdf files of their solution. Files should be scanned instead of photographed. Files must be uploaded to canvas in the time allotted. Files that are uploaded significantly after the exam period is over will will not be accepted. If canvas crashes while you are uploading files, then email me your files right away.

There will be four midterm exams on Wednesdays Feb. 3, Feb. 24. Mar. 17 and Apr. 7. These will be given as timed quizzes in canvas. The midterm score will be the sum of the best three midterm scores. Their total weight in the final score is 42%.

Students seeking academic accommodations should contact me and make necessary arrangements before the first exam. Students will have to arrange an alternative with me beforehand if they are unable to take the exam at the scheduled time. Otherwise, except in extraordinary circumstances, no makeup exams will be given.

Students will be able to submit an optional analysis of their exams shortly after exams are returned. The analysis will be complete discussions and corrections of two exam problems. Students must answer all parts of an analysis question even if they got some parts right on their exam. Student will be able to submit solutions to alternate questions if their original exams were essentially correct. Each analysis turned in will add up to 10% of the total to the students exam score.

The final exam will be half on the material since the last midterm and half comprehensive. Students will not be able to submit an analysis of the final. Students must take the final to pass the class. I will be available via email during the exams to answer questions.

Homework will be assigned weekly. The homework problems will be listed on the class webpage and on the class canvas page. Students may discuss homework with each other, but are expected to write up assignments on their own. Copying from another student, using a calculator or getting help on the internet is cheating and will be treated as academic misconduct. If you use

any reference other than the textbook, you are expected to quote the reference in full and provide a complete citation. Refer to the American mathematical Society style guide

https://www.ams.org/publications/authors/AMS-StyleGuide-online.pdf

or APA, MLA or Chicago styles recommended by University of Utah Writing Program

https://writingcenter.utah.edu/writing-resources/index.php

● Students are expected to participate in our synchronous zoom class discussions. Attendance may be taken for statistical purposes, but will not be a percentage of the grade.

● The Mathematics Department strongly recommends an in class final for all undergraduate classes. Students must take the final to pass the class. The final exam will be a canvas quiz, just as were the midterms. It will be given during the final exam period determined the University schedule.

● Students should check their grades and notify me if they notice any mistake, for instance:

○ It is the student's responsibility to ensure the accuracy of all recorded homework, quizzes, online assignments, and exam grades. Also you should keep as record all your graded assignments. If you see any error in your grades on Canvas, reach out to the instructor as soon as possible, or at the latest within two weeks from when the assignment was returned.

Late Assignments/Missed Assignments/Regrading Policies:

● Homework will be due every Friday at 4:00pm. To ease the burden of our homework grader, who has so little time to grade, homework that is late but not more than one week late will receive half credit. Homework that is more than one week late will receive no credit at all. If there are any queries on homework, please write your question and send it to me with a copy of the homework and its grading. I will forward your query to the grader.

Incompletes: According to university policy, to be considered for an incomplete, a student must have 20% or less of the course work remaining and be passing the course with a C or better. You must request an incomplete grade and I will consider giving that grade only under exceptional circumstances.

K. ACADEMIC CODE OF CONDUCT

Students are encouraged to review the Student Code for the University of Utah: https://regulations.utah.edu/academics/6-400.php. In order to ensure that the highest standards of academic conduct are promoted and supported at the University, students must adhere to generally accepted standards of academic honesty, including but not limited to refraining from cheating, plagiarizing, research misconduct, misrepresenting one's work, and/or inappropriately collaborating. A student who engages in academic misconduct as defined in Part I.B. may be subject to academic sanctions including but not limited to a grade reduction, failing grade, probation, suspension or dismissal from the program or the University, or revocation of the student's degree or certificate. Sanctions may also

include community service, a written reprimand, and/or a written statement of misconduct that can be put into an appropriate record maintained for purposes of the profession or discipline for which the student is preparing. Incidents of academic misconduct (e.g. cheating, plagiarizing, misrepresenting one's work, and/or inappropriately collaborating on exams) will be subject to penalty per Section V of Policy 6-400, the Student Code. Incidents of academic dishonesty on homework assignments will result in a minimum penalty of a full letter-grade reduction and up to a failing grade (E) for the course. Incidents of academic dishonesty on exams will result in a minimum penalty of a failing grade (E) for the course, and the incident(s) will be referred to the dean of your major-department college for possible further sanction.). I endorse the Chemistry Department's Code of Conduct at this link

https://csme.utah.edu/chemistry-code-of-conduct/

L. ADDITIONAL POLICIES AND RESOURCES

Inclusivity Statement: It is my intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is my intent to present materials and activities that are respectful of diversity: age, color, disability, gender, gender identity, gender expression, national origin, political affiliation, race, religion, sexual orientation, and veteran status, and other unique identities. gender, sexuality, disability, age, socioeconomic status, ethnicity, race, culture, and other unique identities. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups. In addition, if any of our class meetings conflict with your religious events, please let me know so that we can make arrangements for you.

https://csme.utah.edu/sample-inclusivity-statements/

Discrimination and Harassment: 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 Office of the Dean of Students, 270 Union Building, 801-581-7066.   To report to the police, contact the Department of Public Safety, 801-585-2677(COPS). Please see Student Bill of Rights, section E

http://regulations.utah.edu/academics/6-400.php.

I will listen and believe you if someone is threatening you.

Names/Pronouns. Canvas allows students to change the name that is displayed AND allows them to add their pronouns to their Canvas name. 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, which managed can be managed at any time). 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 or on assignments. Please advise me of any name or pronoun changes so I can help create a learning environment in which you, your name, and your pronoun are respected. If you need any assistance or support, please reach out to the LGBT Resource Center.

https://lgbt.utah.edu/campus/faculty_resources.php

English Language Learners. If you are an English language learner, please be

aware of several resources on campus that will support you with your language and writing development. These resources include: the Writing Center

http://writingcenter.utah.edu/

the Writing Program

http://writing- program.utah.edu/

the English Language Institute

http://continue.utah.edu/eli/

Please let me know if there is any additional support you would like to discuss for this class.

Undocumented Student Support. Immigration is a complex phenomenon with broad impact—those who are directly affected by it, as well as those who are indirectly affected by their relationships with family members, friends, and loved ones. If your immigration status presents obstacles to engaging in specific activities or fulfilling specific course criteria, confidential arrangements may be requested from the Dream Center. Arrangements with the Dream Center will not jeopardize your student status, your financial aid, or any other part of your residence. The Dream Center offers a wide range of resources to support undocumented students (with and without DACA) as well as students from mixed-status families. To learn more, please contact the Dream Center at 801.213.3697 or visit

dream.utah.edu.

Veterans Center. If you are a student veteran, the U of Utah has a Veterans Support Center located in Room 161 in the Olpin Union Building. Hours: M-F 8-5pm. Please visit their website for more information about what support they offer, a list of ongoing events and links to outside resources:

http://veteranscenter.utah.edu/

Please also let me know if you need any additional support in this class for any reason.

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 801-581-7776 or

www.wellness.utah.edu

Student Success Advocates: The mission of Student Success Advocates is to support students in making the most of their University of Utah experience (ssa.utah.edu). They can assist with mentoring, resources, etc. Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact a Student Success Advocate for support

https://asuu.utah.edu/displaced-students

The Americans with Disabilities Act: 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, veteran¹s status or genetic information. If you or someone you know has been harassed or assaulted on the basis of your sex, including sexual orientation or gender identity/expression, you are encouraged to report it to the University's Title IX Coordinator; Director, Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or to 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 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

University Counseling Center: The University Counseling Center (UCC) provides developmental, preventive, and therapeutic services and programs that promote the intellectual, emotional, cultural, and social development of University of Utah students. They advocate a philosophy of acceptance, compassion, and support for those they serve, as well as for each other. They aspire to respect cultural, individual and role differences as they continually work toward creating a safe and affirming climate for individuals of all ages, cultures, ethnicities, genders, gender identities, languages, mental and physical abilities, national origins, races, religions, sexual orientations, sizes and socioeconomic statuses.

Office of the Dean of Students: The Office of the Dean of Students is dedicated to being a resource to students through support, advocacy, involvement, and accountability. It serves as a support for students facing challenges to their success as students, and assists with the interpretation of University policy and regulations. Please consider reaching out to the Office of Dean of Students for any questions, issues and concerns. 200 South Central Campus Dr., Suite 270. Monday-Friday 8 am-5 pm.