SPRING 2021   MATH 3323 CRN 22991   MATRIX ALGEBRA

TR 12:00 pm – 1:20 pm ONLINE (all times MST)
Lectures will be conducted live at these times and recorded for later access.

PREREQUISITES: MATH 1312. Students are assumed to be proficient on all prerequisites

Dr. Luis Valdez-Sanchez   lvsanchez@utep.edu
Office Hours: ONLINE TBA

COURSE DESCRIPTION / COURSE OBJECTIVES

In this course we will discuss several topics that evolve from the solution of linear systems via matrix methods, including matrix operations, linear dependence and independence of vectors, invertible matrices, vector spaces and subspaces, basis and dimension of a vector space, orthogonal bases and the Gramm-Schmidt process, linear transformations, and determinants. These fundamental techniques will then be used to study the eigenvalue and eigenvector problem for a square matrix, and the techniques developed applied in turn to the solution of the diagonalization problem for a square matrix.

A common thread through these topics is the notion of the RREF (reduced row echelon form) of a matrix, a construction that can be used to answer a very wide range of questions. Deciding when and how to use this tool requires a good understanding of the algorithms that emanate from RREF. Unlike other courses, say Calculus, where the justification behind some results can be very intricate, in our case all justifications will be very accessible and require only mathematical maturity and attention to detail (hence the university junior level of the course). Computationally, all algorithms will involve only the operations of addition and multiplication of integers (with the occasional fractions). Conceptually the content will be more demanding since many new definitions and terminology will be introduced and used to verify all algorithms we use.

The emphasis will be in the application of the algorithms developed, that is, in the details of the justification and procedure that answer a question rather than just on the answer. For this reason we will work only with relatively small matrices with nice integer entries where all necessary operations can be performed by hand without the need of any software or calculator.

At the end of the course the student will be expected to be able solve a wide range of problems by using the skills and understanding gained through the lectures to pick the correct tools, results or algorithms as developed in the course.

REQUIRED MATERIALS

The course is organized by following the presentation of the material in Chapters 1, 3 and 4 of this textbook:
 ***Introduction to Linear Algebra*, by Johnson-Riess-Arnold, Addison Wesley, Fifth Edition**
 (an earlier edition may be used but user is responsible to make up for any differences in content)

The lecture notes posted in Blackboard will also follow the same organization and content and, though not as complete as the textbook, may be used as a summary of the textbook material.

SUGGESTED FREE MATERIALS

A first course in Linear Algebra, by Robert Beezer; free textbook, download at
http://linear.ups.edu/
Linear Algebra, by Jim Hefferon; free textbook/answers, download at
http://joshua.smcvt.edu/linearalgebra/

These free textbooks can be used as alternate sources of examples with solutions and practice exercises.

COURSE ASSIGNMENTS AND GRADING

--Homework for each section is suggested but not collected. Online quizzes based on the suggested homework problems and examples from the textbook and lectures will be regularly distributed via Blackboard (see schedule at end of Syllabus).

--There will be two midterm exams and a final exam (see schedule at end of Syllabus).

-- **The final exam will be comprehensive and include material from chapters 1, 3, and 4.**

--General instructions for homework, quizzes and exams can be found at the end of this Syllabus and in Blackboard.

Each midterm is worth 25%, quizzes are worth 10%, and the final exam is worth 40%. Grades will be assigned as follows: A≥90; B≥80, C≥70, D≥60, F<60.

The course grade will be the total grade obtained by combining midterms, quizzes and final exam grades, or a C if the final exam grade is ≥70 and the total grade is < 70.

A course grade of F will be assigned when the final exam is missing.

Academic performance on the items indicated above will be the only factor used to determine course grades. No extra credit work is available.

Partial/full credit will be given to solutions of exam problems only when procedures discussed in the lectures are used and justifications for steps are provided. For example, if a linear system is solved using the standard elimination method without taking advantage of the augmented matrix method developed in the course, the solution will receive very little or no credit. Credit will also be withheld when using incorrect notation or notation not defined in the textbook/lectures.

SPECIAL DATES

-- March 15-19 Spring Break
-- March 26   – Cesar Chavez Day – no classes
-- April 1   – Drop/Withdrawal deadline: **no drops permitted after this date**
-- April 2   - Spring Study Day
-- May 7   - Dead Day

TECHNOLOGY REQUIREMENTS

Course content is delivered via the Internet through the Blackboard learning management system. Ensure your UTEP e-mail account is working and that you have access to the Web and

a stable web browser. Google Chrome and Mozilla Firefox are the best browsers for Blackboard; other browsers may cause complications. When having technical difficulties, update your browser, clear your cache, or try switching to another browser.

You will need to have access to a computer/laptop, scanner or cellphone scanning app, a webcam, and a microphone. You may also need to download or update the following software: Adobe Acrobat Reader, Windows Media Player, QuickTime. Check that your computer hardware and software are up-to-date and able to access all parts of the course.

IMPORTANT: If you encounter technical difficulties beyond your scope of troubleshooting, please contact the UTEP Help Desk as they are trained specifically in assisting with technological needs of students. Please do not contact me for this type of assistance. The Help Desk is much better equipped than I am to assist you!

COURSE COMMUNICATION

Because this is an online class, we won't see each other in the ways you may be accustomed to: during class time, small group meetings, and office hours. However, there are a number of ways we can keep the communication channels open:

- **Office Hours**: We will not be able to meet on campus, but I will still have online office hours for your questions and comments about the course.
- **Email**: UTEP e-mail is the best way to contact me. I will make every attempt to respond to your e-mail within 24-48 hours of receipt. **When e-mailing me, be sure to email from your UTEP student account and please put the course number and class meeting time in the subject line.** In the body of your e-mail, clearly state your question. At the end of your e-mail, be sure to put your first and last name, and your university identification number.
- **Announcements**: Check the Blackboard announcements frequently for any updates, deadlines, or other important messages.

NETIQUETTE

As we know, sometimes communication online can be challenging. It's possible to miscommunicate what we mean or to misunderstand what our classmates mean given the lack of body language and immediate feedback. Therefore, please keep these netiquette (network etiquette) guidelines in mind. Failure to observe them may result in disciplinary action.

- Always consider audience. This is a college-level course; therefore, all communication should reflect polite consideration of other's ideas.

- Respect and courtesy must be provided to classmates and to the instructor at all times. No harassment or inappropriate postings will be tolerated.

- When reacting to someone else's message, address the ideas, not the person. Post only what anyone would comfortably state in a face-to-face situation.

- Blackboard is not a public internet venue; all postings to it should be considered private and confidential. Whatever is posted on in these online spaces is intended for classmates and professor only. **Do not copy documents and paste them to a publicly accessible website, blog, or other space.**

COPYRIGHT STATEMENT FOR COURSE MATERIALS

All materials used in this course are protected by copyright law. The course materials are only for the use of students currently enrolled in this course and only for the purpose of this course. **They may not be further disseminated.**

ATTENDANCE AND PARTICIPATION

Attendance in the course is determined by participation in the learning activities of the course. Your participation in the course is important not only for your learning and success but also to create a community of learners. Participation is accomplished by Reading/Viewing all course materials to promote their understanding. **It is also strongly recommended attending the live online lectures where questions can be asked directly.**

COURSE DROP POLICY

According to UTEP Curriculum and Classroom Policies, "When, in the judgment of the instructor, a student has been absent to such a degree as to impair his or her status relative to credit for the course, the instructor may drop the student from the class with a grade of "W" before the course drop deadline and with a grade of "F" after the course drop deadline." See academic regulations in the UTEP Undergraduate Catalog for a list of excused absences. **Therefore, if I find that you are at risk of failing due to non-performance in the course, including excessive absence, neglect, or lack of effort (for example, after missing 3 quizzes or 1 midterm without communicating with the instructor and providing an academically valid excuse), I may drop you from the course.**

If you feel that you are unable to complete the course successfully, please let me know and then contact the [Registrar's Office](#) to initiate the drop process. If you do not, you are at risk of receiving an "F" for the course.

DEADLINES (see schedule at end of Syllabus)

--Quizzes will be posted regularly in Blackboard with a specific due date and can be taken once at any time within a specific time window before their due date.

--Midterm exams and the final exam will be posted in Blackboard and can be taken only within a specific window of time. No solutions can be submitted once the exam window closes.

MAKE-UP WORK

Solutions to quizzes will be posted in Blackboard right after their due date, and therefore cannot be made up. The final exam cannot be made up. Make-up midterms will be given *only* in the case of a *documented* emergency. Note that make-up work may require more intensive preparation and may be graded with penalty points. If you miss a test and the reason is not considered excusable, you will receive a zero. It is therefore important to reach out to me—in advance if possible—and explain with proper documentation why you missed a given course

examination. Once a deadline has been established for make-up work, no further extensions or exceptions will be granted.

ALTERNATIVE MEANS OF SUBMITTING WORK IN CASE OF TECHNICAL ISSUES

I strongly suggest that you submit your work with plenty of time to spare in the event that you have a technical issue with the course website, network, and/or your computer. I also suggest you save all your work (answers to discussion points, quizzes, exams, and essays) in a separate Word or PDF document as a back-up. This way, you will have evidence that you completed the work and will not lose credit. If you are experiencing difficulties submitting your work through the course website, please contact the UTEP Help Desk. **You can email me your back-up document as a last resort, but it will not replace the submitted version.**

INCOMPLETE GRADE POLICY

Incomplete grades may be requested only in exceptional circumstances after you have completed the two midterm exams and before taking the final exam. Talk to me immediately if you believe an incomplete is warranted. If granted, we will establish a contract of work to be completed with deadlines.

ACCOMMODATIONS POLICY

The University is committed to providing reasonable accommodations and auxiliary services to students, staff, faculty, job applicants, applicants for admissions, and other beneficiaries of University programs, services and activities with documented disabilities in order to provide them with equal opportunities to participate in programs, services, and activities in compliance with sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) of 1990 and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. Reasonable accommodations will be made unless it is determined that doing so would cause undue hardship on the University.

Students requesting an accommodation based on a disability must register with the [UTEP Center for Accommodations and Support Services](#) (CASS). Contact the Center for Accommodations and Support Services at 915-747-5148, or email them at [cass@utep.edu](#), or apply for accommodations online via the [CASS portal](#).

COVID-19 Accommodations

Students are not permitted on campus when they have a positive COVID-19 test, exposure or symptoms. If you are not permitted on campus, you should contact me as soon as possible so we can arrange necessary and appropriate accommodations.

Classes with on-campus meetings: Students who are considered high risk according to CDC guidelines and/or those who live with individuals who are considered high risk may contact

SCHOLASTIC INTEGRITY

Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. It includes, but is not limited to, cheating, plagiarism, and collusion. Cheating may involve copying from or providing information to another

student, possessing unauthorized materials during a test, or falsifying research data on laboratory reports. Plagiarism occurs when someone intentionally or knowingly represents the words or ideas of another as ones' own. Collusion involves collaborating with another person to commit any academically dishonest act. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. All suspected violations of academic integrity at The University of Texas at El Paso must be reported to the Office of Student Conduct and Conflict Resolution (OSCCR) for possible disciplinary action. To learn more, please visit HOOP: Student Conduct and Discipline.

CLASS RECORDINGS

The use of recordings will enable you to have access to class lectures, group discussions, and so on in the event you miss a synchronous or in-person class meeting due to illness or other extenuating circumstance. Our use of such technology is governed by the Federal Educational Rights and Privacy Act (FERPA) and UTEP's acceptable-use policy. A recording of class sessions will be kept and stored by UTEP, in accordance with FERPA and UTEP policies. Your instructor will not share the recordings of your class activities outside of course participants, which include your fellow students, teaching assistants, or graduate assistants, and any guest faculty or community-based learning partners with whom we may engage during a class session. **You may not share recordings outside of this course. Doing so may result in disciplinary action.**

COVID-19 PRECAUTIONS

You must STAY AT HOME and REPORT if you (1) have been diagnosed with COVID-19, (2) are experiencing COVID-19 symptoms, or (3) have had recent contact with a person who has received a positive coronavirus test. Reports should be made at screening.utep.edu. If you know of anyone who should report any of these three criteria, you should encourage them to report. If the individual cannot report, you can report on their behalf by sending an email to COVIDaction@utep.edu.

For each day that you attend campus—for any reason—you must complete the questions on the UTEP screening website (screening.utep.edu) prior to arriving on campus. The website will verify if you are permitted to come to campus. Under no circumstances should anyone come to class when feeling ill or exhibiting any of the known COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible, and alternative instruction will be provided. Students are advised to minimize the number of encounters with others to avoid infection.

Wear face coverings when in common areas of campus or when others are present. You must wear a face covering over your nose and mouth at all times in this class. If you choose not to wear a face covering, you may not enter the classroom. If you remove your face covering, you will be asked to put it on or leave the classroom. Students who refuse to wear a face covering and follow preventive COVID-19 guidelines will be dismissed from the class and will be subject to disciplinary action according to Section 1.2.3 *Health and Safety* and Section 1.2.2.5 *Disruptions* in the UTEP Handbook of Operating Procedures.

Classes with on-campus meetings. Please note that if COVID-19 conditions deteriorate in the City of El Paso, all course and lab activities may be transitioned to remote delivery.

COURSE RESOURCES

UTEP provides a variety of student services and support:
Technology Resources
- Help Desk: Students experiencing technological challenges (email, Blackboard, software, etc.) can submit a ticket to the UTEP Helpdesk for assistance. Contact the Helpdesk via phone, email, chat, website, or in person if on campus.

Academic Resources
- UTEP Library: Access a wide range of resources including online, full-text access to thousands of journals and eBooks plus reference service and librarian assistance for enrolled students.
- Math Tutoring Center (MaRCS): Ask a tutor for help and explore other available math resources.

Individual Resources
- Military Student Success Center: Assists personnel in any branch of service to reach their educational goals.
- Center for Accommodations and Support Services: Assists students with ADA-related accommodations for coursework, housing, and internships.
- Counseling and Psychological Services: Provides a variety of counseling services including individual, couples, and group sessions as well as career and disability assessments.

Weekly Calendar (TBA, Subject to Change)

This calendar provides an overview of the course. The actual due date for each quiz will be posted in Blackboard. The actual midterm dates will be announced in class and Blackboard a week in advance.

Suggested homework problems instructions.

1. The textbook homework problems will not be collected; the list is provided as an example of a minimal set of problems to be attempted.

2. You should aim at practicing on as many textbook exercises as possible, even those that do not appear in the list of suggested problems.

3. Work on homework exercises on your own before seeking help in solving them, otherwise you will not benefit as much from this activity.

4. Ideally, you should ask any questions about the homework problems in person, either in class or during office hours. Otherwise, after working on a problem for some time on your own, you may ask me a question via email and include a scan of your work.

5. More solved examples and exercises can be found in the free Suggested Textbooks given in the syllabus or in Blackboard under Other Resources.

Online quizzes general instructions.

1. The goal of the quiz problems is to help you diagnose how well you understand the relevant methods and ideas. They also provide a good idea of the type of problems that will appear in the midterms and final exam. It is therefore very important that you are well prepared before attempting each quiz.

2. Online quizzes will be posted in Blackboard and only be accessible for a certain time period (say 12-24 hours). Quizzes will also have a time limit for its completion (up to 60 minutes); once started, a quiz must be completed within the allotted time, at the end of which the quiz will automatically close. Quizzes will typically be in multiple choice format.

3. Each online quiz should be treated as an in-class quiz, except that you may consult your notes/textbook. **No collaboration with anyone (me included, as well as no online help) is allowed, and no calculator/software may be used.**

4. It is strongly suggested that quiz problems be attempted after reading each textbook section, practicing on the textbook exercises and reviewing the lecture examples and discussion.

5. As a rule of thumb, each quiz problem should be solved in 10-12 minutes once enough practice problems have been attempted successfully. Taking too long to solve a problem (15-20 mins) is an indication of a lack of preparation or insufficient proficiency on prerequisites.

6. Solutions to all quizzes and midterms will be posted in BlackBoard shortly after their deadline. It is your responsibility to compare your quiz/midterm answers with the posted solutions and make corrections when necessary, so as to not repeat any quiz mistakes on an exam.

Online exams (midterms/final) general instructions.

1. Each midterm exam will be administered via Blackboard during a specific time window.

2. Each online exam should be treated as an in-class exam, except that you may consult your notes/textbook. **No collaboration with anyone (me included, as well as no online help) is allowed, and no calculator/software may be used.**

3. Each midterm may contain 4-6 problems (40-60 points) and run for 1 hour and 30 minutes. The final exam may contain 6-8 problems (60-90 points) and run for 2 hours and 45 minutes.

4. Exam questions will require detailed written solutions. The solution files must be produced in PDF and uploaded to Blackboard before the end of the exam.

5. Late submissions of solutions may be accepted (by email) only if the lateness was due to software problems and proof of completion before the deadline is provided (in the form of a time stamp from the software used to produce the solutions in PDF).

6. **Accepted late submissions will be deducted 10% of the total points earned for each 5 minutes or fraction elapsed after the end of the exam.**