



Texas A&M University-San Antonio
Department of Computational, Engineering, and Mathematical Sciences
Math 3340, Section 001, Linear Algebra with Applications, F24

Instructor: Prof. Burak Aksoylu

Class Hours: TR 12:30-1:45 PM

Classroom: HALL 307

Office Hours: TR 11:00 AM-12:30 PM or by appointment.

Credit Hours: 3

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Course Description and Materials

Catalog Description: Systems of linear equations, matrices, determinants, vector spaces, eigenvectors, eigenvalues, orthogonality, linear transformations and their representations by matrices, and applications.

Prerequisite: Math 2313 and Math 2113 (or Math 2413); all prerequisites require a grade of "C" or higher.

Required Textbook: Linear Algebra and Its Applications by David C. Lay, Steven R. Lay, and Judi J.

McDonald (6th edition), Pearson. E-text will be used through Pearson MyLab Platform. Purchasing a hard copy of the textbook is optional.

Student Learning Objectives: Upon completion of this course, students will be able to:

- Demonstrate an understanding and working knowledge of matrices and vectors.
- Formulate and solve problems requiring the application of matrices, linear transformations and their properties.
- Exhibit a basic proficiency in determining and explaining linear algebraic structures and their analytic and/or geometric interpretation.
- Demonstrate a basic understanding of the underlying principles of vector spaces.
- Write clearly about linear algebra concepts to include definitions, counterexamples and simple proofs.
- Apply linear algebra to model basic geometric, biological or physical problems.

List of Topics: Topics to be covered include but are not limited to the following (18 sections):

Chapter 1 Linear Equations in Linear Algebra (Sections 1.1-1.9)

1.1 System of Linear Equations

1.2 Row Reduction and Echelon Forms

1.3 Vector Equations

1.4 The Matrix Equation $Ax=b$

1.5 Solution Sets of Linear Systems

1.6 Applications of Linear Systems

1.7 Linear Independence

1.8 Introduction to Linear Transformations

1.9 The Matrix of a Linear Transformation

Chapter 2 Matrix Algebra (Sections 2.1-2.3)

2.1 Matrix Operations

2.2 The Inverse of Matrix

2.3 Characteristics of Invertible Matrices

Chapter 3 Determinants (Sections 3.1-3.2)

3.1 Introduction to Determinants

3.2 Properties of Determinants

Chapter 4 Vector Spaces (Sections 4.1-4.2)

4.1 Vector Spaces and Subspaces

4.2 Null, Column, and Row Spaces and Linear Transformations

Chapter 5 Eigenvalues and Eigenvectors (Sections 5.1-5.2)

5.1 Eigenvectors and Eigenvalues

5.2 The Characteristic Equation

Active Learning and Inquiry Based Learning: This course implements active learning and inquiry-based learning approaches throughout, and the students are strongly encouraged to preview the teaching materials and be aware of many class participation and self/peer study activities.

Course Expectations and Requirements

Class Attendance: Students are expected to attend classes as scheduled and be prepared to participate in discussions, in-class exercises, quizzes and problem presentation. Class attendance during class. If we meet at Zoom, then attendance is taken in the Zoom Chatroom by typing "Hi, Burak Aksoylu is present." You are strongly encouraged to attend all classes. I give out a lot of extra credit for class participation which will be directly added to your score as a bonus.

Midterm Exams: There will be two in-class exams during the semester. In case you miss an exam or find out that you will miss an exam, you should contact me either in person or by e-mail, at least one week in advance of the exam for non-emergency cases or within 24-hrs of the scheduled exam date for emergency cases. Any missed exam counts as a 0 unless the student has a valid documented excuse and contacts me as soon as possible after the excuse for missing the test arises. Examples of valid documented excuses are sickness documented with a doctor's note, death in the family documented with a copy of the death notice, attending university-sponsored events with a Dean's excuse, etc. Minor headaches or attending sports events (without Dean's excuse) are not examples of emergency situations.

Final Exam: In order to pass this class students must take a final exam scheduled during Finals Week. Final exams cannot be rescheduled or missed (for dire and unforeseen medical or family emergencies, students must consult with me).

Homework/Quizzes: Homework and quizzes will be assigned through Pearson MyLab. You will be solving 330 required and 270 optional problems for extra credit. Quizzes will be directly from the homework. I strongly encourage you to do the homework regularly. There will be 4 quizzes and your lowest score will be dropped. There will not be make up for Quiz. Quizzes typically will have two parts: **in-class 5 problems (80% weight)** and **take home 10 problems (20% weight)**.

Calculator: A calculator is not necessary in this course and will be not allowed on quizzes and exams. In addition, graphic calculators, cell phones, laptops, iPads, kindles, and any other electronic/mobile devices are absolutely **NOT** allowed during the tests/exams. Once found, your tests/exams would receive a grade of zero.

Grading Policy

The final course grade is calculated as follows:

Attendance/Participation: 5%; Homework: 10%; Quizzes: 20%; Exams: 40% (20% each); Final Exam: 25%.

A = 90~100% B = 80~89.9% C = 70~79.9% D = 60~69.9% F = 0~59.9%

Online Resources:

YouTube channel: **Kimberly Brehm**, Linear Algebra (entire course) from the same book.

<https://www.youtube.com/playlist?list=PLI-gb0E4MII03hiCrZa7YqxUMeEPmZqK>

YouTube channel: **Math and Science**, Linear Algebra Vol I playlist.

<https://www.youtube.com/watch?v=zxIj1vNVS4A&list=PLnVYEPTNGNtWTvXx12Mf4JCsStSWFuhPY&pp=iAQB>

Khan Academy

<https://www.khanacademy.org/math/linear-algebra>

I am a big fan of **using computer code for teaching**. I have found out that the book titled “Linear Algebra: Theory, Intuition, Code” by Mike X Cohen is written using this approach.

<https://www.amazon.com/Linear-Algebra-Theory-Intuition-Code/dp/9083136604>

YouTube channel: Mike X Cohen

https://www.youtube.com/channel/UCUR_LsXk7IYyueSnXcNextQ/videos

Udemy course: Complete linear algebra: theory and implementation in code

<https://www.udemy.com/course/linear-algebra-theory-and-implementation/?couponCode=202301>

Linear Algebra is an integral part of **Data Science and Machine Learning**. Check out the website for applications:

<https://sincxpress.com>

Tips for Studying: The main characteristic of the mathematic course is the fact that all the topics are linked to each other, so that every newly introduced concept is built upon old ones. The most common reason for difficulty in this course is failure to study consistently. You must study this course consistently. You are developing a skill; **no one would expect to become good at tennis if s/he only played once a month**. In order to succeed, the student should do all the following:

- Read the material in the text before class. Attend the lecture and take notes. During the lectures relevant examples are discussed.
- Practice solving many problems in the e-text even not assigned ones.
- Do *all* assigned homework and attempt *all* questions.
- Seek help. Visit your instructor during office hours. Ask about poorly understood points as soon as possible.
- Exam Preparation. Redo all the homework, quiz problems, and questions solved in the class.
- Work neatly. Make sure you show all work. Answers/solutions given with no explanation may receive little or no credit! During the exams, if you have time, check your work.
- Keep track of your grade on BlackBoard or Pearson MyLab.

University Policies and Resources

Academic Accommodations for Individuals with Disabilities: Texas A&M University-San Antonio is committed to providing all students with reasonable access to learning opportunities and accommodations in accordance with The Americans with Disabilities Act, as amended, and Section 504 of the Rehabilitation Act. If you experience barriers to your education due to a disability or think you may have a disability, Disability Support Services is located in the Central Academic Building, Suite 210. You can also contact us via phone at (210) 784-1335, visit us <https://www.tamusa.edu/Disability-Support-Services/index.html> or email us at dss@tamusa.edu. Disabilities may include, but are not limited to, attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability-related needs with Disability Support Services and their instructors as soon as possible.

Academic Learning Center: The Academic Learning Center provides free course-based tutoring to all currently enrolled students at Texas A&M University-San Antonio. Students wishing to work with a tutor can make appointments through the Brainfuse online tutoring platform. Brainfuse can be accessed in the *Tools* section of Blackboard. You can contact the Academic Learning Center by emailing tutoring@tamusa.edu, calling (210) 784-1307, or visiting the Central Academic Building, room 202.

Counseling/Mental Health Resources: As a college student, there may be times when personal stressors interfere with your academic performance and negatively impact your daily functioning. If you are experiencing emotional difficulties or mental health concerns, support is available to you through the Student Counseling Center (SCC). To schedule an appointment, call 210-784-1331 or visit Madla 120. All mental health services provided by the SCC are free and confidential (as the law allows). The Student Counseling Center provides brief individual and group therapy, crisis intervention, consultation, case management, and prevention services. For more information on SCC services visit tamusa.edu/studentcounseling

Crisis support is available 24/7 by calling the SCC at 210-784-1331 (after-hours select option '2').

Additionally, the TELUS Student Support App provides a variety of mental health resources to including support for in the moment distress, an anonymous peer to peer support network, mental health screenings, podcasts, and articles to improve your mental wellbeing.



Emergency Preparedness: JagE Alert is Texas A&M University-San Antonio’s mass notification. In the event of an emergency, such as inclement weather, students, staff and faculty, who are registered, will have the option to receive a text message, email with instructions and updates. To register or update your information visit: <https://tamusa.bbcportal.com/>.

More information about Emergency Operations Plan and the Emergency Action Plan can be found here: <https://www.tamusa.edu/about-us/emergency-management/>.

Download the SafeZone App (<https://safezoneapp.com/>) for emergencies or call (210) 784-1911. Non-Emergency (210) 784-1900.

Financial Aid and Verification of Attendance: According to the following federal regulation, 34 CFR 668.21: U.S. Department of Education (DoE) Title IV regulation, a student can only receive Title IV funds based on Title IV eligibility criteria which include class attendance. If Title IV funds are disbursed to ineligible students (including students who fail to begin attendance), the institution must return these funds to the U.S. DoE within 30 days of becoming aware that the student will not or has not begun attendance. Faculty will provide the Office of Financial Aid with an electronic notification if a student has not attended the first week of class. Any student receiving federal financial aid who does not attend the first week of class will have their aid terminated and returned to the DoE. Please note that any student who stops attending at any time during the semester may also need to return a portion of their federal aid.

Writing, Language, and Digital Composing Center: The Writing, Language, and Digital Composing Center supports graduate and undergraduate students in all three colleges as well as faculty and staff. Tutors work with students to develop reading skills, prepare oral presentations, and plan, draft, and revise their written assignments. Our language tutors support students enrolled in Spanish courses and students composing in Spanish for any assignment. Our digital studio tutors support students working on digital projects such as eportfolios, class presentations, or other digital multimedia projects. Students can schedule appointments through JagWire under the Student Services tab. Click on “Writing, Language, and Digital Composing Center” to make your appointment. The Center offers face-to-face, synchronous online, and asynchronous digital appointments. More information about what services we offer, how to make an appointment, and how to access your appointment can be found on our website at <https://www.tamusa.edu/academics/>.

Meeting Basic Needs: Any student who has difficulty affording groceries or accessing sufficient food to eat every day or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to submit a CARE referral (<https://www.tamusa.edu/university-policies/Student-Rights-and-Responsibilities/file-a-report.html>) for support. Furthermore, please notify the professor if you are comfortable in doing so. This will enable them to direct you to available resources.

Military Affairs: Veterans and active-duty military personnel are welcomed and encouraged to visit the Office of Military Affairs for any question involving federal or state VA Education Benefits. Visit the

Patriots' Casa building, room 202, or to contact the Office of Military Affairs with any questions at military.va@tamusa.edu or (210)784-1397.

Religious Observances: Texas A&M University-San Antonio recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holidays according to their tradition. Under the policy, students are provided an opportunity to make up any examination, study, or course work requirements that may be missed due to a religious observance provided they notify their instructors before the end of the second week of classes for regular session classes.

The Six-Drop Rule: Students are subject to the requirements of Senate Bill (SB) 1231 passed by the Texas Legislature in 2007. SB 1231 limits students to a maximum of six (6) non-punitive course drops (i.e., courses a student chooses to drop) during their undergraduate careers. A non-punitive drop does not affect the student's GPA. However, course drops that exceed the maximum allowed by SB 1231 will be treated as "F" grades and will impact the student's GPA.

Statement of Harassment and Discrimination: Texas A&M University-San Antonio is committed to the fundamental principles of academic freedom, equal opportunity, and human dignity. To fulfill its multiple missions as an institution of higher learning, A&M-San Antonio encourages a climate that values and nurtures collegiality and the uniqueness of the individual within our state, nation, and world. All decisions and actions involving students and employees should be based on applicable law and individual merit. Texas A&M University-San Antonio, in accordance with applicable federal and state law, prohibits discrimination, including harassment, on the basis of race, color, sex, religion, national origin, age, disability, genetic information, veteran status, sexual orientation, gender identity, gender expression, or pregnancy/parenting status. Individuals who believe they have experienced harassment or discrimination prohibited by this statement are encouraged to contact the appropriate offices within their respective units.

Texas A&M University-San Antonio faculty are committed to providing a safe learning environment for all students and for the university as a whole. If you have experienced any form of sex- or gender-based discrimination or harassment, including sexual assault, sexual harassment, domestic or dating violence, or stalking, know that help and support are available. A&M-San Antonio's Title IX Coordinator can support those impacted by such conduct in navigating campus life, accessing health and counseling services, providing academic and housing accommodations, and more. The university strongly encourages all students to report any such incidents to the Title IX Coordinator. Please be aware that all A&M-San Antonio employees (other than those designated as confidential resources such as counselors and trained victim advocates) are required to report information about such discrimination and harassment to the university. This means that if you tell a faculty member about a situation of sexual harassment, sexual violence, or other related misconduct, the faculty member must share that information with the university's Title IX Coordinator (titleix@tamusa.edu, 210-784-2061, CAB 439K). If you wish to speak to a confidential employee who does not have this reporting requirement, you can contact the Student Counseling Center at (210) 784-1331 or visit them in Madla 120.

Pregnant/Parenting Students: Texas A&M-San Antonio does not require a pregnant or parenting student, solely because of that status or issues related to that status, to (1) take a leave of absence or withdraw from their degree or certificate program; (2) limit the student's studies; (3) participate in an alternative program; (4) change the student's major, degree, or certificate program; or (5) refrain from joining or cease participating in any course, activity, or program at the University. The university will provide such reasonable accommodations to pregnant students as would be provided to a student with a temporary

medical condition that are related to the health and safety of the student and the student's unborn child. These could include maintaining a safe distance from substances, areas, and activities known to be hazardous to pregnant individuals and their unborn child; excused absences because of illness or medical appointments; modified due dates for assignments; rescheduled tests/exams; taking a leave of absence; and being provided access to instructional materials and video recordings of lectures for excused absences, if these would be provided to any other student with an excused absence. Pregnant/parenting students are encouraged to contact the Title IX Coordinator with any questions or concerns related to their status (titleix@tamusa.edu; 210-784-2061; CAB 439K).

Texas A&M-San Antonio has also designated the Title IX Coordinator as the liaison officer for current or incoming students who are the parent or guardian of a child younger than 18 years of age. The Title IX Coordinator can provide students with information regarding support services and other resources.

Students' Rights and Responsibilities: The following statement of students' rights and responsibilities is intended to reflect the philosophical base upon which University Student Rules are built. This philosophy acknowledges the existence of both rights and responsibilities, which is inherent to an individual not only as a student at Texas A&M University-San Antonio but also as a citizen of this country.

Students' Rights

1. A student shall have the right to participate in a free exchange of ideas, and there shall be no University rule or administrative rule that in any way abridges the rights of freedom of speech, expression, petition and peaceful assembly as set forth in the U.S. Constitution.
2. Each student shall have the right to participate in all areas and activities of the University, free from any form of discrimination, including harassment, on the basis of race, color, national or ethnic origin, religion, sex, disability, age, sexual orientation, gender identity, gender expression, and pregnancy/parenting or veteran status in accordance with applicable federal and state laws.
3. A student has the right to personal privacy except as otherwise provided by law, and this will be observed by students and University authorities alike.
4. Each student subject to disciplinary action arising from violations of university student rules shall be assured a fundamentally fair process.

Students' Responsibilities

1. A student has the responsibility to respect the rights and property of others, including other students, the faculty, and administration.
2. A student has the responsibility to be fully acquainted with the published University Student Rules found in the Student Handbook, [Student Code of Conduct](#), on our website, and University Catalog, and to comply with them, as well as with federal, state, and local laws.
3. A student has the responsibility to recognize that student actions reflect upon the individuals involved and upon the entire University community.
4. A student has the responsibility to recognize the University's obligation to provide a safe environment for learning.
5. A student has the responsibility to check their university email for any updates or official university notifications.

We expect that students will behave in a manner that is dignified, respectful, and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation, or disability. Conduct that infringes on the rights of another individual will not be tolerated. Students are expected to exhibit a high level of honesty and integrity in their pursuit of higher education. Students engaging in an act that violates the standards of academic integrity will find themselves facing academic and/or disciplinary sanctions. Academic misconduct is any act, or attempt, which gives an unfair advantage to the student. Additionally, any behavior specifically prohibited by a faculty member in the course syllabus or class discussion may be considered as academic misconduct. For more information on academic misconduct policies and procedures please review the Student Code of Conduct (<https://www.tamusa.edu/university-policies/student-rights-and-responsibilities/documents/Student-Handbook-2022-23.pdf>) or visit the resources available in the OSRR website (<https://www.tamusa.edu/university-policies/student-rights-and-responsibilities/academic-integrity.html>).

No Use of Generative AI Permitted: MATH 3340 assumes that all work submitted by students will be generated by the students themselves, working individually or in groups. Students should not have another person/entity do the writing of any portion of an assignment for them, which includes hiring a person or a company to write assignments and/or using artificial intelligence (AI) tools like ChatGPT. Use of any AI-generated content in this course qualifies as academic dishonesty and violates Texas A&M-San Antonio's standards of academic integrity.

Important Dates:

August 26	First day of class
September 2	Labor Day Holiday
November 11	Last day to drop with an automatic "W"
November 19	Last day to drop a course or withdraw from the University
November 27	Study Day – No classes
November 28-30	Thanksgiving Holiday – No classes
December 5	Last day of classes
December 6	Study Day – No classes
December 7-13	Final exams

The complete academic calendar is available online: <https://www.tamusa.edu/academics/academic-calendar/index.html>.

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