

# MATH 3332-130, 11257, Linear Algebra

**Spring 2021**

Texas A&M University-Central Texas

## COURSE DATES, MODALITY, AND LOCATION

This course meets virtually from January 19th, 2021 – May 15th, 2021 using Webex Meetings, with supplemental materials made available online through the A&M-Central Texas Canvas Learning Management System [<https://tamuct.instructure.com/>].

The course will meet via Webex on Tuesday and Thursday from 9:30 a.m. – 10:45 a.m from January 19th, 2021 – May 15th, 2021

## INSTRUCTOR AND CONTACT INFORMATION

**Instructor:** Dr. Audrie Cruz-Sealey

**Office:** Virtual Office Hours By Appointment

**Email:** [a.cruz-sealey@tamuct.edu](mailto:a.cruz-sealey@tamuct.edu)

**Office Hours**

**By Appointment Only**

Office hours will take place in the WebEx conference room.

### Student-instructor interaction

Responses to emails will take place within 24 hours, including weekends.

## WARRIOR SHIELD

### Emergency Warning System for Texas A&M University-Central Texas

Warrior Shield is an emergency notification service that gives Texas A&M University-Central Texas the ability to communicate health and safety emergency information quickly via email, text message, and social media. All students are automatically enrolled in Warrior Shield through their myCT email account.

Connect to Warrior Shield by [911Cellular](https://portal.publicsafetycloud.net/Account/Login) [https://portal.publicsafetycloud.net/Account/Login] to change where you receive your alerts or to opt out. By staying enrolled in Warrior Shield, university officials can quickly pass on safety-related information, regardless of your location.

## COVID-19 SAFETY MEASURES

To promote public safety and protect students, faculty, and staff during the coronavirus pandemic, Texas A&M University-Central Texas has adopted policies and practices to minimize virus transmission. All members of the university community are expected to adhere to these measures to ensure their own safety and the safety of others. Students must observe the following practices while participating in face-to-face courses, course-related activities (office hours, help sessions, transitioning to and between classes, study spaces, academic services, etc.) and co-curricular programs:

- **Self-monitoring**—Students should follow CDC recommendations for self-monitoring. Students who have a fever or exhibit symptoms of COVID-19 should participate in class remotely and should not participate in face-to-face instruction. Students required to quarantine must participate in courses and course-related activities remotely and must not attend face-to-face course activities. Students should notify their instructors of the quarantine requirement. Students under quarantine are expected to participate in courses and complete graded work unless they have symptoms that are too severe to participate in course activities.
  - **Face Coverings**—Face coverings must be worn inside of buildings and within 50 feet of building entrances on the A&M-Central Texas Campus. This includes lobbies, restrooms, hallways, elevators, classrooms, laboratories, conference rooms, break rooms, non-private office spaces, and other shared spaces. Face coverings are also required in outdoor spaces where physical distancing is not maintained. The university will evaluate exceptions to this requirement on a case by case basis. Students can request an exception through the Office of Access and Inclusion in Student Affairs.
- o If a student refuses to wear a face covering, the instructor should ask the student to leave and join the class remotely. If the student does not leave the class, the faculty member should report that student to the Office of Student Conduct. Additionally, the faculty member may choose to teach that day's class remotely for all students.
- **Physical Distancing**—Physical distancing must be maintained between students, instructors, and others in the course and course-related activities.
  - **Classroom Ingress/Egress**—Students must follow marked pathways for entering and exiting classrooms and other teaching spaces. Leave classrooms promptly after course activities have concluded. Do not congregate in hallways and maintain 6-foot physical distancing when waiting to enter classrooms and other instructional spaces.
  - The university will notify students in the event that the COVID-19 situation necessitates changes to the course schedule or modality.

## COURSE INFORMATION

### Course Overview and description

Linear Algebra is the study of the algebra of curve-free functions extended into three- or higher-dimensional space. It covers the knowledge and skills necessary to apply vectors, matrices, matrix theorems, and linear transformations and to use technology to model and solve real-life problems. It also covers properties of and proofs about vector spaces.

Topics include linear equations and their matrix-vector representation  $Ax=b$ ; row reduction; linear transformations and their matrix representations (shear, dilation, rotation, reflection); matrix operations matrix inverses and invertible matrix characterizations; computing determinants; relating determinants to area and volume; and axiomatic and intuitive definitions of vector spaces and subspaces; and proving theorems about them.

### Course Objective or Goal

## Student Learning Outcomes

1. Solve systems of linear equations using Gaussian elimination.
2. Perform basic operations with matrices.
3. Determine the inverse of a non-singular matrix and use it to solve a system expressed as  $Ax = b$ .
4. Compute the norm of a vector.
5. Apply determinants to area and volume.
6. Determine if a set of vectors is linearly independent.
7. View a linear transformation as a matrix multiplication.
8. Determine if a subset of vectors is a subspace.
9. Define dimensions and rank of a matrix.
10. Determine eigenvalues and eigenvectors.
11. Read and write basic proofs

## Required Reading and Textbook(s)

Linear Algebra and Its Applications (6<sup>th</sup> Edition) by Lay

## COURSE REQUIREMENTS

### Grading Criteria Rubric and Conversion

Category	Weight (%)	Points
Homework (MyMathLab)	20%	200 points
Quizzes (MyMathLab)	20%	6 Quizzes
Labs	10%	5 labs @ 20 pts each
Exam I (MyMathLab)	15%	150 points
Exam II (MyMathLab)	15%	150 points
Final Exam (MyMathLab)	20%	200 points
<b>Total</b>	<b>100%</b>	<b>1000 points</b>

### Posting of Grades

- **MyMathLab Homework and Quizzes will be auto graded.**
- **Exams and labs will be graded and returned to the student no later than one week after the due date.**

## Grading Policies

**MyMathLab Homework & Quizzes**—One extension is permitted for the entire course. The homework and quiz for one chapter will be extended for one week past the original due date.

**Exams**—Make up exams can only be taken after documentation of an emergent situation is submitted to the instructor.

Exams will be proctored using Proctorio. You will need to have a webcam and audio set up in order for your test to be proctored.

**Labs**—Labs will NOT be accepted after the due date.

Labs will be proctored using Proctorio. You will need to have a webcam and audio set up in order for your lab to be proctored.

## COURSE OUTLINE AND CALENDAR

### Complete Course Calendar

Day	Topic	Reading	Due Date
January 19 <sup>th</sup>	Intro to Course		
January 21 <sup>st</sup>	Systems of Linear Equations & Row Reduction and Echelon Forms	Section 1.1 and 1.2	
January 26 <sup>th</sup>	Vector Equations & The Matrix Equation $Ax = b$	Section 1.3 and 1.4	
January 28 <sup>th</sup>	Solution Sets & Applications of Linear Systems	Section 1.5 and 1.6	
February 2 <sup>nd</sup>	Linear Independence	Section 1.7	
February 4 <sup>th</sup>	Introduction and the Matrix of Linear Transformations	Section 1.8 and 1.9	
February 9 <sup>th</sup>	Linear Models in Business, Science, and Engineering	Section 1.10	Chapter 1 Due: 02/15/21
February 11 <sup>th</sup>	Matrix Operations & The Inverse of a Matrix	Section 2.1 and 2.2	
February 16 <sup>th</sup>	Characteristics of Invertible Matrices	Section 2.3	
February 18 <sup>th</sup>	Partitioned Matrices	Section 2.4	
February 23 <sup>rd</sup>	Applications to Computer Graphics	Section 2.7	Chapter 2 Due: 03/01/21
February 25 <sup>th</sup>	Introduction & Properties of Determinants	Section 3.1 & 3.2	
March 2 <sup>nd</sup>	Cramer's Rule, Volume, and Linear Transformation	Section 3.3	Chapter 3 Due: 03/08/21
	<b>Unit #1 Exam</b>	<b>Opens: 03/08/21</b>	<b>Closes: 03/14/21</b>
March 4 <sup>th</sup>	Subspaces of $R^n$ & Dimensions and Rank	Section 2.8 and 2.9	· Call these topic sections
March 9 <sup>th</sup>	Eigenvectors and Eigenvalues	Section 5.1	
March 11 <sup>th</sup>	The Characteristic Equations	Section 5.2	
MARCH 15 <sup>TH</sup> – MARCH 19 <sup>TH</sup> SPRING BREAK			

March 23 <sup>rd</sup>	Diagonalization	Section 5.3	
March 25 <sup>th</sup>	Eigenvectors and Linear Transformations	Section 5.4	
March 30 <sup>th</sup>	Complex Eigenvalues	Section 5.5	
April 1 <sup>st</sup>	Applications of Differential Equations	Section 5.7	Chap 5 Due: 04/05/21
April 6 <sup>th</sup>	Inner Product, Length and Orthogonality	Section 6.1	
April 8 <sup>th</sup>	Orthogonal Sets & Projections	Section 6.2 and 6.3	
April 13 <sup>th</sup>	Least-Squares Problems	Section 6.5	
April 15 <sup>th</sup>	Inner Product Spaces & Applications	Section 6.7 & 6.8	Chap 6 Due: 04/19/21
	<b>Unit #2 Exam</b>	<b>Open: 04/19/21</b>	<b>Closes: 04/25/21</b>
April 20 <sup>th</sup>	Diagonalization of Symmetric Matrices	Section 7.1	
April 22 <sup>nd</sup>	Quadratic Forms	Section 7.2	
April 27 <sup>th</sup>	Constrained Optimization	Section 7.3	
April 29 <sup>th</sup> ,	The Singular Value Decomposition	Section 7.4	
May 4 <sup>th</sup>	Applications to Image Processing and Statistics	Section 7.5	Chap 7 Due: 05/09/21
May 6 <sup>th</sup>	Final Exam Review		
	<b>Final Exam</b>		<b>Closes/Due: 05/13/21</b>

### Important University Dates

January 19 <sup>th</sup> , 2021	Classes Begin for Spring Semester
January 21 <sup>st</sup> , 2021	Deadline for Add, Drop, and Late Registration for 16- and First 8-week
February 3 <sup>rd</sup> , 2021	Deadline to drop 16-week Classes with No Record
March 15 <sup>th</sup> – March 19 <sup>th</sup>	Spring Break—No Classes
March 22 <sup>nd</sup> , 2021	Class Schedule Published for Summer Semester
March 26 <sup>th</sup> , 2021	Deadline for Graduation Application for Ceremony Participation
April 5 <sup>th</sup> , 2021	Registration Opens for Summer Semester
April 30 <sup>th</sup> , 2021	Deadline to Drop 16-Week Classes with a Quit (Q) or Withdraw (W)
May 14 <sup>th</sup> , 2021	Spring Semester Ends
May 15 <sup>th</sup> , 2021	Spring Commencement Ceremony
May 18 <sup>th</sup> , 2021	Deadline for Faculty Submission of 16-Week and Second 8-Week Final Class Grades (due by 3pm)

## TECHNOLOGY REQUIREMENTS AND SUPPORT

### Technology Requirements

You will need a webcam and microphone on your computer/laptop.

This course will use the A&M-Central Texas Instructure Canvas learning management system. We strongly recommend the latest versions of Chrome or Firefox browsers. Canvas no longer supports any version of Internet Explorer.

Logon to A&M-Central Texas Canvas [<https://tamuct.instructure.com/>] or access Canvas through the TAMUCT Online link in myCT [<https://tamuct.onecampus.com/>]. You will log in through our Microsoft portal.

Username: Your MyCT email address. Password: Your MyCT password

### Canvas Support

Use the Canvas Help link, located at the bottom of the left-hand menu, for issues with Canvas. You can select “Chat with Canvas Support,” submit a support request through “Report a Problem,” or call the Canvas support line: 1-844-757-0953.

For issues related to course content and requirements, contact your instructor.

### Online Proctored Testing

A&M-Central Texas uses Proctorio for online identity verification and proctored testing. This service is provided at no direct cost to students. If the course requires identity verification or proctored testing, the technology requirements are: Any computer meeting the minimum computing requirements, plus web camera, speaker, and microphone (or headset). Proctorio also requires the Chrome web browser with their custom plug in.

### Other Technology Support

For log-in problems, students should contact Help Desk Central

24 hours a day, 7 days a week

Email: [helpdesk@tamu.edu](mailto:helpdesk@tamu.edu)

Phone: (254) 519-5466

[Web Chat](http://hdc.tamu.edu): [<http://hdc.tamu.edu>]

*Please let the support technician know you are an A&M-Central Texas student.*

## UNIVERSITY RESOURCES, PROCEDURES, AND GUIDELINES

### Drop Policy

If you discover that you need to drop this class, you must complete the [Drop Request](#) Dynamic Form through Warrior Web.

[<https://dynamicforms.ngwebsolutions.com/casAuthentication.ashx?InstID=eaed95b9-f2be-45f3-a37d-46928168bc10&targetUrl=https%3A%2F%2Fdynamicforms.ngwebsolutions.com%2FSubmit%2FForm%2FStart%2F53b8369e-0502-4f36-be43-f02a4202f612>].

Faculty cannot drop students; this is always the responsibility of the student. The Registrar’s Office will provide a deadline on the Academic Calendar for which the form must be completed. Once you submit the completed form to the Registrar’s Office, you must go into Warrior Web and confirm that you are no longer enrolled. If you still show as enrolled, FOLLOW-UP with the Registrar’s Office immediately. You are to attend class until the procedure is complete to avoid penalty for absence. Should you miss the drop deadline or fail to follow the procedure, you will receive an F in the course, which may affect your financial aid and/or VA educational benefits.

## Academic Integrity

Texas A&M University -Central Texas values the integrity of the academic enterprise and strives for the highest standards of academic conduct. A&M-Central Texas expects its students, faculty, and staff to support the adherence to high standards of personal and scholarly conduct to preserve the honor and integrity of the creative community. Academic integrity is defined as a commitment to honesty, trust, fairness, respect, and responsibility. Any deviation by students from this expectation may result in a failing grade for the assignment and potentially a failing grade for the course. Academic misconduct is any act that improperly affects a true and honest evaluation of a student's academic performance and includes, but is not limited to, working with others in an unauthorized manner, cheating on an examination or other academic work, plagiarism and improper citation of sources, using another student's work, collusion, and the abuse of resource materials. All academic misconduct concerns will be referred to the university's Office of Student Conduct. Ignorance of the university's standards and expectations is never an excuse to act with a lack of integrity. When in doubt on collaboration, citation, or any issue, please contact your instructor before taking a course of action.

For more [information regarding the Student Conduct process](https://www.tamuct.edu/student-affairs/student-conduct.html), [https://www.tamuct.edu/student-affairs/student-conduct.html].

If you know of potential honor violations by other students, you may [submit a report](https://cm.maxient.com/reportingform.php?TAMUCentralTexas&layout_id=0), [https://cm.maxient.com/reportingform.php?TAMUCentralTexas&layout\_id=0].

## Academic Accommodations

At Texas A&M University-Central Texas, we value an inclusive learning environment where every student has an equal chance to succeed and has the right to a barrier-free education. The Office of Access and Inclusion is responsible for ensuring that students with a disability receive equal access to the university's programs, services and activities. If you believe you have a disability requiring reasonable accommodations please contact the Office of Access and Inclusion, WH-212; or call (254) 501-5836. Any information you provide is private and confidential and will be treated as such.

For more information please visit our [Access & Inclusion](https://tamuct.instructure.com/courses/717) Canvas page (log-in required) [https://tamuct.instructure.com/courses/717]

### Important information for Pregnant and/or Parenting Students

Texas A&M University-Central Texas supports students who are pregnant and/or parenting. In accordance with requirements of Title IX and related guidance from US Department of Education's Office of Civil Rights, the Dean of Student Affairs' Office can assist students who are pregnant and/or parenting in seeking accommodations related to pregnancy and/or parenting. Students should seek out assistance as early in the pregnancy as possible. For more information, please visit [Student Affairs](https://www.tamuct.edu/student-affairs/index.html) [https://www.tamuct.edu/student-affairs/index.html]. Students may also contact the institution's Title IX Coordinator. If you would like to read more about these [requirements and guidelines](http://www2.ed.gov/about/offices/list/ocr/docs/pregnancy.pdf) online, please visit the website [http://www2.ed.gov/about/offices/list/ocr/docs/pregnancy.pdf].

Title IX of the Education Amendments Act of 1972 prohibits discrimination on the basis of sex and gender—including pregnancy, parenting, and all related conditions. A&M-Central Texas is able to provide flexible and individualized reasonable accommodation to pregnant and parenting students. All pregnant and parenting students should contact the Associate Dean in the Division of Student Affairs at (254) 501-5909 to seek out assistance. Students may also contact the University's Title IX Coordinator.

## Tutoring

Tutoring is available to all A&M-Central Texas students, on a remote online basis. Visit the Academic Support Community in Canvas to view schedules and contact information. Subjects tutored on campus include Accounting, Advanced Math, Biology, Finance, Statistics, Mathematics, and Study Skills. Student success coaching is available online upon request.

If you have a question regarding tutor schedules, need to schedule a tutoring session, are interested in becoming a tutor, success coaching, or have any other question, contact Academic Support Programs at (254) 501-5836, visit the Office of Student Success at 212F Warrior Hall, or by emailing [studentsuccess@tamuct.edu](mailto:studentsuccess@tamuct.edu).

Chat live with a tutor 24/7 for almost any subject from on your computer! Tutor.com is an online tutoring platform that enables A&M-Central Texas students to log in and receive online tutoring support at no additional cost. This tool provides tutoring in over 40 subject areas except writing support. Access Tutor.com through Canvas.

## University Writing Center

The University Writing Center (UWC) at Texas A&M University–Central Texas (TAMUCT) is a free service open to all TAMUCT students. For the Spring 2021 semester, all services will be online as a result of the COVID-19 pandemic. The hours of operation are from 10:00 a.m.-5:00 p.m. Monday thru Thursday with satellite hours Monday thru Thursday from 6:00-9:00 p.m. The UWC is also offering hours from 12:00-3:00 p.m. on Saturdays.

Tutors are prepared to help writers of all levels and abilities at any stage of the writing process. By providing a practice audience for students' ideas and writing, our tutors highlight the ways in which they read and interpret students' texts, offering guidance and support throughout the various stages of the writing process. While tutors will not write, edit, or grade papers, they will assist students in developing more effective composing practices. Whether you need help brainstorming ideas, organizing an essay, proofreading, understanding proper citation practices, or just want a quiet place to work, the UWC is here to help!

Students may arrange a one-to-one session with a trained and experienced writing tutor by making an appointment via [WOnline](https://tamuct.mywconline.com/) [https://tamuct.mywconline.com/]. In addition, you can email Dr. Bruce Bowles Jr. at [bruce.bowles@tamuct.edu](mailto:bruce.bowles@tamuct.edu) if you have any questions about the UWC and/or need any assistance with scheduling.

## University Library

The University Library provides many services in support of research across campus and at a distance. We offer over 200 electronic databases containing approximately 250,000 eBooks and 82,000 journals, in addition to the 85,000 items in our print collection, which can be mailed to students who live more than 50 miles from campus. Research guides for each subject taught at A&M-Central Texas are available through our website to help students navigate these resources. On campus, the library offers technology including cameras, laptops, microphones, webcams, and digital sound recorders.

Research assistance from a librarian is also available 24 hours a day through our online chat service, and at the reference desk when the library is open. Research sessions can be scheduled for more comprehensive assistance, and may take place on Skype or in-person at the library. Assistance may cover many topics, including how to find articles in peer-reviewed journals, how to cite resources, and how to piece together research for written assignments.

Our 27,000-square-foot facility on the A&M-Central Texas main campus includes student lounges, private study rooms, group work spaces, computer labs, family areas suitable for all ages, and many other features. Services such as interlibrary loan, TexShare, binding, and laminating are available. The library frequently offers workshops, tours, readings, and other events. For more information, please visit our [Library website](http://tamuct.libguides.com/index) [http://tamuct.libguides.com/index].

**For Spring 2021, all reference service will be conducted virtually. Please go to our [Library website](http://tamuct.libguides.com/index) [http://tamuct.libguides.com/index] to access our virtual reference help and our current hours.**

## OPTIONAL POLICY STATEMENTS

### A Note about Sexual Violence at A&M-Central Texas

Sexual violence is a serious safety, social justice, and public health issue. The university offers support for anyone struggling with these issues. University faculty are mandated reporters, so if someone discloses that they were sexually assaulted (or a victim of Domestic/Dating Violence or Stalking) while a student at TAMUCT, faculty members are required to inform the Title



IX Office. If you want to discuss any of these issues confidentially, you can do so through Student Counseling (254-501-5955) located on the second floor of Warrior Hall (207L).

Sexual violence can occur on our campus because predators often feel emboldened, and victims often feel silenced or shamed. It is incumbent on ALL of us to find ways to actively create environments that tell predators we don't agree with their behaviors and tell survivors we will support them. Your actions matter. Don't be a bystander; be an agent of change. For additional information on campus policy and resources visit the [Title IX webpage](https://www.tamuct.edu/compliance/titleix.html) [<https://www.tamuct.edu/compliance/titleix.html>].

### **Behavioral Intervention**

Texas A&M University-Central Texas cares about the safety, health, and well-being of its students, faculty, staff, and community. If you are aware of individuals for whom you have a concern, please make a referral to the Behavioral Intervention Team. Referring your concern shows you care. You can complete the [referral](https://cm.maxient.com/reportingform.php?TAMUCentralTexas&layout_id=2) online [[https://cm.maxient.com/reportingform.php?TAMUCentralTexas&layout\\_id=2](https://cm.maxient.com/reportingform.php?TAMUCentralTexas&layout_id=2)].

Anonymous referrals are accepted. Please see the [Behavioral Intervention Team](https://www.tamuct.edu/student-affairs/bat.html) website for more information [<https://www.tamuct.edu/student-affairs/bat.html>]. If a person's behavior poses an imminent threat to you or another, contact 911 or A&M-Central Texas University Police at 254-501-5800.

## **INSTRUCTOR POLICIES**

**Homework and Quizzes:** may be accessed after due date with a 30% deduction. The final day to access homework and quizzes is Sunday of Week 15.

**Exams:** In order to make up an exam, documentation must be provided by a physician or the professor will decide if the situation deems an extension.

**Labs:** Labs will **NOT** be accepted after the due date.

### **VIRTRUAL CLASSROOM SETUP**

1. Please keep your cell phones on vibrate.
2. Sign into Webex Lectures using your First and Last Name.

### **Copyright Notice**

Students should assume that all course material is copyrighted by the respective author(s). Reproduction of course material is prohibited without consent by the author and/or course instructor. Violation of copyright is against the law and Texas A&M University-Central Texas' Code of Academic Honesty. All alleged violations will be reported to the Office of Student Conduct.

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