

**MATH 5350-110, CRN 80005, Advanced Analysis  
Fall 2020 rev. 08.23.20**

Texas A&M University-Central Texas

**COURSE DATES, MODALITY, AND LOCATION**

Aug 24, 2020 - Dec 11, 2020

The instructional method is online: “Fully online courses have no on-campus, classroom, or synchronous activity. All course activity is done online. These courses may require virtual proctored exams” The course uses the A &M-Central Texas Canvas Learning Management System [<https://tamuct.instructure.com/>].

**INSTRUCTOR AND CONTACT INFORMATION**

**Instructors:** Christopher Thron

**Office:** All contact is online

**Phone or text:** (585) 204-0314

**Email:** Please email instructors via Canvas email.

**Google Hangouts** (for online office hours): [chris.thron@gmail.com](mailto:chris.thron@gmail.com)

**Office Hours**

General office hours are noon-1pm on Tuesdays and Thursdays. Office hours are conducted via Google Hangouts ([hangouts.google.com](https://hangouts.google.com)). Send an invite to [chris.thron@gmail.com](mailto:chris.thron@gmail.com), and send an email, phone, or text informing me of your Hangouts email address.

Weekly interactive problem sessions will be held from 7-8:30 p.m. on Tuesdays and Thursdays on WebEx inside Canvas. Problem sessions are recorded. Students are encouraged to attend as many problem sessions as possible.

**Student-instructor interaction**

Please feel free to text, email, or send a Hangouts message any time day or night. I will answer as soon as I can.

Students are also encouraged and expected to communicate with and help each other.

**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**

### **Course Objective**

#### **Student Learning Outcomes**

After completing this course, students will have mastery of the basic techniques and concepts of Linear Algebra, including: linear systems of equations and Gaussian elimination; echelon forms; general solutions of homogeneous and inhomogeneous linear equations; matrix multiplication; inverting matrices; determinants, their properties and computation; vector spaces, subspaces, bases, and dimension; eigenvalues, eigenvectors, eigenspaces, and dimension; matrix diagonalization; linear transformation (kernel, range, and matrix representation). Students will also have

#### **Required Reading and Textbook(s)**

Marcel Finan, Linear Algebra for Engineers:

<https://faculty.atu.edu/mfinan/LINENG.pdf>

Other course materials may be found at the following web site:

<https://ocw.mit.edu/courses/mathematics/18-065-matrix-methods-in-data-analysis-signal-processing-and-machine-learning-spring-2018/#>

The course uses the following textbook

Strang, Gilbert. *Linear Algebra and Learning from Data*. [Wellesley-Cambridge Press](#), 2019. ISBN: 9780692196380.

## **COURSE REQUIREMENTS AND GRADING**

The course grade will be based on problems written by the student and graded by the instructor. Problems will be a combination of homework, quizzes and tests.

A: 90.0-100%; B: 80-89.9%; C: 70-79.9%; D: 60-69.9%

*Students within one point of the next grade level will have their grades bumped up if they complete all assignments.*

### **Posting of Grades**

All submitted work will be graded within one week, and results posted on Canvas.

## **COURSE OUTLINE AND CALENDAR**

### **Complete Course Calendar**

*Assignments are listed with the student learning outcomes (SLO) that they address*

August 25, 27: Basic linear algebra review (Finan text)

September 1, 3: Basic linear algebra review (Finan text)

September 8, 10: Column Space of  $A$ , Multiplying and factoring matrices (Lecs 1,2)  
September 15, 17: Orthogonal columns and inverse, eigenvalues and eigenvectors (Lecs 3,4)  
September 22, 24: Positive definite matrices, SVD (Lecs 5,6)  
Sep 30, Oct 1: Eckart-Young, Vector and Matrix norms (Lecs 7,8)  
October 6, 8: , Least squares, Survey of  $Ax=b$  (Lecs 9-10)  
October 13, 15:  $Ax=b$  and singular values (Lecs 11,12)  
October 20, 22: Low rank changes in  $A$ , Matrix derivatives (Lecs 14,15)  
October 27, 29: Derivatives of Inverse, decreasing singular values (Lecs 16,17)  
November 3, 5: Parameters in matrix decompositions, Saddle points (Lecs 18,19)  
November 10, 12: Inequalities, function minimization (Lecs 20,21)  
November 17, 19: Gradient descent (Lecs 22,23)  
November 24, 26: Stochastic gradient descent, Neural nets (Lecs 25,26)  
December 1, 3: TBD  
December 8: Final exam. (All SLO's)

### **Important University Dates**

See the TAMUCT Academic Calendar: <https://www.tamuct.edu/registrar/academic-calendar.html>]

## **TECHNOLOGY REQUIREMENTS AND SUPPORT**

### **Technology Requirements**

Since course materials are exclusively online, home access to a computer, tablet, or smart phone with Internet connection is required. Since office hours are largely online, your computing device should be equipped with audio (microphone and speakers/headphone).

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.*

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## 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-](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)

[46928168bc10&targetUrl=https%3A%2F%2Fdynamicforms.ngwebsolutions.com%2Fsubmit%2FForm%2Fstart%2F53b8369e-0502-4f36-be43-f02a4202f612](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](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. Tutors will return at the Tutoring Center in Warrior Hall, Suite 111 in the Fall 2020. 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 Fall 2020 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 online 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 Fall 2020, 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.**

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## 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].

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.



