

Math 5305-110, 80487, Probability and Statistics

Fall 2023

Texas A&M University-Central Texas

COURSE DATES, MODALITY, AND LOCATION

August 28th, 2023 – December 15th, 2023

This is a 100% online course and uses the A&M-Central Texas Canvas Learning Management System <https://tamuct.instructure.com/>

INSTRUCTOR AND CONTACT INFORMATION

	Instructor: Dr. Christopher Thron
Office	All contact is online
Phone, text, and WhatsApp	(585) 204-0314
Email	Canvas email or thron@tamuct.edu
Online Meetings	Google Meet: chris.thron@gmail.com (In addition to course WebEx)
Contact	You may contact me at any time by email or text. Often I can respond immediately, and if necessary, we can meet online to answer your question right away. WhatsApp is also OK, but I may not see it right away.
Office Hours	I am generally available online from 11:30 A.M.-1:30 P.M. on weekdays. Students are encouraged to make appointments to discuss issues with homework (both before and after grading).

COURSE INFORMATION

Course Objective or Goal: This course provides an introduction to probability theory, starting with probability axioms and properties, and fundamental concepts such as counting techniques, conditional probability, statistical independence, and Bayes's Theorem. Probabilities, expected value, and variance are then explored for univariate discrete and continuous random variables. Characteristics of specific distributions, such as the binomial, Poisson, uniform, normal and exponential distributions, are also investigated. Sampling distributions, and the central limit theorem, Student's distribution, normal approximations to discrete distributions, the bivariate normal distribution, and univariate linear regression are also discussed. Afterwards, confidence

intervals and hypothesis testing are introduced and applied to problems involving populations means and proportions, while emphasizing the concepts of unbiasedness, sufficiency, and sample size.

Student Learning Outcomes

1. Perform calculations and solve applied problems using counting techniques (Week 1-5)
2. Calculate probabilities for univariate random variables, using a probability mass function, probability density function, or cumulative distribution function (Week 2-9)
3. Calculate expected value, variance, and other moments for univariate random variables directly or by using the moment-generating function (week 2-9)
4. Produce descriptive statistics, such as the sample mean and variance, histograms, and box-plots (week 2-9)
5. Apply the central limit theorem, sampling distributions, and normal approximations to discrete distributions (week 7-12)
6. Calculate probabilities and percentiles for the normal distribution and t distribution (week 7-12)
7. Obtaining confidence intervals for population means and proportions, including the calculation of adequate sample sizes (week 9-12)
8. Perform hypothesis tests for population means and proportions (week 9-12)
9. Recognize and interpret Markov processes, and apply them to practical problems week 12-16)

Required Reading and Textbook(s)

All materials can be found at the web site: www.probabilitycourse.com

COURSE REQUIREMENTS

Coursework

Students will have weekly homework assignments (10 points each), weekly proctored quizzes (10 points each) and one final exam (100 points). Partial credit for written work will be awarded as follows:

- 100% Perfect
- 95% Minor careless or technical mistakes
- 90% Minor procedural error
- 80% Conceptual error or major procedural error.
- 70% Major conceptual error
- 60% Makes some relevant steps
- 30% Some effort to solve.

In addition, students will have three ½ hour oral interviews (20 points each) in which students must demonstrate their ability to verbally interact on a mathematical level, including clarity, fluency, comprehension, and content. Oral interviews will be graded according to the following rubric:

	Poor	Fair	Good	Excellent
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	1-2 pts	3 pts	4 pts	5 pts
Clarity	All questions and answers were awkward and incomprehensible.	Questions and answers were awkward and incomprehensible to understand at times.	Questions or answers were awkward at times but always understandable.	Questions and answers were clear and comprehensible.
Fluency	Student was unable to ask or respond to most questions.	Student took a long time to ask and respond to questions. A lot of unnatural pauses and hesitations.	Student was able to ask and answer the questions, but with some difficulty. Use of some awkward/unnatural pauses, but overall speech was not difficult to follow.	Students were able to communicate clearly with no difficulty. Student asked and answered questions with almost no hesitation, and no trace of unusually long pauses or hesitation.
Comprehension	Student was unable to comprehend most questions. Questions had to be repeated several times. Even very simple sentences.	The student showed little comprehension of questions. Questions had to be repeated, but all questions were eventually answered.	The student understood most of what was asked of him/her, and responded in a more or less appropriate manner.	The student fully understood the questions asked and answered correctly.

Content	Did not ask appropriate questions for information, no response to questions.	Asked some inappropriate questions for information or answered question with very limited or off-topic answers.	Gave appropriate questions for survey information but responses were limited in content.	Asked appropriate questions and answered all questions with related information. Did not give any off-topic information that did not fit the situation.
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Posting of Grades

All grades will be posted on Canvas. Students are invited to discuss grades with the instructor.

Grading Policies

- Late assignments are accepted only in the case of medical or family emergency, and documentation is required. The maximum grade for a late assignment is 80% of the total point value.
- The quizzes, and Final exams are proctored exams. Students need to use the Proctorio software to proctor the exams.

COURSE OUTLINE AND CALENDAR

NOTE: Course schedule may be revised during the semester in order to provide a better learning experience. Any changes in schedule will be announced, and an updated syllabus will be made available on Canvas.

Course Calendar

Week	Assignments/Tasks	Due Date (Tuesdays)
1-2	Quiz 1(Basic concepts) &HW1 (Combinatorics)	Sept 5, 2023
2-3	Quiz 2(Combinatorics) & HW2 (Discrete RVs)	Sept 12, 2023
3-4	Quiz 3(Discrete RVs) & HW3 (Continuous RVs)	Sept 19, 2023
4-5	Quiz 4 & HW4 : Review	Sept 26, 2023
5-6	Quiz 5(Continuous RVs) & HW5 (Joint distributions)	Oct 3, 2023
6-7	Quiz 6(Joint distributions) & HW6 (Multiple RVs)	Oct 10, 2023

7-8	Quiz 7(Multiple RVs) & HW7(Limit theorems)	Oct 17, 2023
8-9	Quiz 8 & HW8: Review	Oct 24,2023
9-10	Quiz 9(Limit theorems) & HW9(Inference I)	Oct 31, 2023
10-11	Quiz 10(Inference I) & HW10 (Inference II)	Nov 7, 2023
11-12	Quiz 11(Inference II) & HW11(Random process I)	Nov 14, 2023
12-13	Quiz 12(Random process I) and HW12 (Random process II)	Nov 21, 2023
13-14	Quiz 13 & HW13: Review	Nov 28,2023
14-15	Quiz 14 (Random process II) and HW14 (Review)	Dec 5, 2023
15-16	Review and final exam	Dec 15,2023

Important University Dates: <https://www.tamuct.edu/registrar/academic-calendar.html>

Student-instructor interaction

Instructor will follow the weekly schedule on the syllabus. Announcements will be sent out on Canvas as necessary. It is the student's responsibility to monitor the announcements posted under the "Announcements" tab.

Students can contact the instructor via the Canvas messenger under the "Inbox"-tab or via email at: thron@tamuct.edu. Instructor will respond within 24 hours to emails.

Students' grades for assignments will be posted in Canvas. Students who have questions about their grades are encouraged to discuss with the instructor.

The quizzes and final exam are proctored exams. Students need to install the Proctorio software to proctor these exams.

All meetings will be conducted over WebEx on the Canvas class page.

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

SAFEZONE. SafeZone provides a public safety application that gives you the ability to call for help with the push of a button. It also provides Texas A&M University-Central Texas the ability to communicate emergency information quickly via push notifications, email, and text messages. All students automatically receive email and text messages via their myCT accounts.

Downloading SafeZone allows access to push notifications and enables you to connect directly for help through the app.

You can download SafeZone from the app store and use your myCT credentials to log in. If you would like more information, you can visit the [SafeZone](http://www.safezoneapp.com) website [www.safezoneapp.com].

To register SafeZone on your phone, please follow these 3 easy steps:

1. Download the SafeZone App from your phone store using the link below:
 - o [iPhone/iPad](https://apps.apple.com/app/safezone/id533054756): [https://apps.apple.com/app/safezone/id533054756]
 - o [Android Phone / Tablet](https://play.google.com/store/apps/details?id=com.criticalarc.safezoneapp) [https://play.google.com/store/apps/details?id=com.criticalarc.safezoneapp]
2. Launch the app and enter your myCT email address (e.g. {name}@tamuct.edu)
3. Complete your profile and accept the terms of service

For updates on COVID information, please monitor the University [website](https://www.tamuct.edu/covid19/) [https://www.tamuct.edu/covid19/]

COURSE INFORMATION

Use of current technologies related to creating interactive presentations/documents for math as well as use of current technologies related to mathematical analysis and state certification exams.

TECHNOLOGY REQUIREMENTS AND SUPPORT

Access office hours on Webex:

<https://tamuct.webex.com/meet/thron>

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

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

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 Warrior Center for Student Success, Equity 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](#) Canvas page (log-in required) [<https://tamuct.instructure.com/courses/717>]

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. Any deviation by students from this expectation may result in a failing grade for the assignment and potentially a failing grade for the course. All academic misconduct concerns will be referred to the Office of Student Conduct. 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>].

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

Drop Policy

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

[<https://federation.ngwebsolutions.com/sp/startSSO.ping?PartnerIdpid=https://eis-prod.ec.tamuct.edu:443/samlSso&SpSessionAuthnAdapterId=tamuctDF&TargetResource=https%3a%2f%2fdynamicforms.ngwebsolutions.com%2fSubmit%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.

Important information for Pregnant and/or Parenting Students

Texas A&M University-Central Texas supports students who are pregnant, experiencing pregnancy-related conditions, 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/pregnant-and-parenting-students.html) [https://www.tamuct.edu/student-affairs/pregnant-and-parenting-students.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, both virtually and in-person. Student success coaching is available online upon request.

If you have a question, are interested in becoming a tutor, or in need of success coaching contact the Warrior Center for Student Success, Equity and Inclusion at (254) 501-5836, visit the Warrior Center at 212 Warrior Hall, or by emailing WarriorCenter@tamuct.edu.

To schedule tutoring sessions and view tutor availability, please visit [Tutor Matching Services](https://tutormatchingservice.com/TAMUCT) [https://tutormatchingservice.com/TAMUCT] or visit the Tutoring Center in 111 Warrior Hall.

Chat live with a remote 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 Library & Archives

The University Library & Archives provides many services in support of research across campus and at a distance. We offer over 200 electronic databases containing approximately 400,000

eBooks and 82,000 journals, in addition to the 96,000 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 virtually through WebEx, Microsoft Teams or in-person at the library. [Schedule an appointment here](https://tamuct.libcal.com/appointments/?g=6956) [https://tamuct.libcal.com/appointments/?g=6956]. 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]

University Writing Center

University Writing Center: Located in Warrior Hall 416, the University Writing Center (UWC) at Texas A&M University–Central Texas (A&M–Central Texas) is a free service open to all A&M–Central Texas students. The hours of operation are from 10:00 a.m.-5:00 p.m. Monday thru Thursday in Warrior Hall 416 (with online tutoring available every hour as well) with satellite hours available online only Monday thru Thursday from 6:00-9:00 p.m. and Saturday 12:00-3:00 p.m.

Tutors are prepared to help writers of all levels and abilities at any stage of the writing process. While tutors will not write, edit, or grade papers, they will assist students in developing more effective composing practices. 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. In addition, students may work independently in the UWC by checking out a laptop that runs the Microsoft Office suite and connects to WIFI, or by consulting our resources on writing, including all of the relevant style guides. 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 [WCOonline](https://tamuct.mywconline.com/) [https://tamuct.mywconline.com/]. In addition, you can email Dr. Bruce Bowles Jr. at bruce.bowles@tamuct.edu if you have any questions about the UWC, need any assistance with scheduling, or would like to schedule a recurring appointment with your favorite tutor.

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 Wellness and 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](#) online

[https://cm.maxient.com/reportingform.php?TAMUCentralTexas&layout_id=2].

Anonymous referrals are accepted. Please see the [Behavioral Intervention Team](#) website for more information [<https://www.tamuct.edu/bit>]. If a person's behavior poses an imminent threat to you or another, contact 911 or A&M-Central Texas University Police at 254-501-5805.

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.