

Math 5374-115, 60204, Introduction to Machine Learning

Summer 2023

Texas A&M University-Central Texas

COURSE DATES, MODALITY, AND LOCATION

Jun 5th, 2023 - Jul 28th, 2023

This is a 100% online course and uses the A&M-Central Texas Canvas Learning Management System

<https://tamuct.instructure.com/>

All course materials will be posted on Canvas.

Students are required to use the following platform for certain assignments:

www.Openai.com

Students are allowed and encouraged to use Generative AI platforms and tools for assignments.

Student will need access to the brilliant.org platform. Please navigate to:

INSTRUCTOR AND CONTACT INFORMATION

Instructor: Mienie Roberts (Ph.D.)

Office: Heritage Hall, Room 302K or Online

Phone: (903) 705-9703

Email: Preferred: Canvas Inbox

Other: dekoock@tamuct.edu

Office Hours online over Webex:

Mondays: 1 pm – 2 pm

Wednesdays: 1 pm – 2 pm

Click on the following link to meet with the instructor during her office hours or by appointment:

https://teams.microsoft.com/l/meetup-join/19:meeting_NDdjNTI1YzgtZmY1NS00ZWNiLWJhYzUtMjNkZThmMmE3MGEx@thread.v2/0?context=%7B%22Tid%22:%229eed4e30-00f7-4484-9ff1-

93ad8005acec%22,%22Oid%22:%22fd507602-9cdc-4477-9774-38f1e2aad94e%22%7D

Student-instructor interaction

I will check messages once a day on the CANVAS inbox system and reply within 24 hours. Students are expected to check their CANVAS email and announcements daily. **NO LATE ASSIGNMENTS WILL BE ACCEPTED.**

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

COURSE INFORMATION

This course introduces principles, algorithms, and applications of machine learning from the point of view of modeling and prediction. The class will cover topics in Regression, Classification, Neural Networks, Linear Algebra, Statistics, Probability, and Reinforcement Learning. The course will use the R/RStudio statistical and SQL software. The course will also use the Microsoft Azure AI Portfolio.

Prerequisites: The student should understand basic probability and statistics, and college-level algebra and calculus. For example, it is expected that the student knows about standard probability distributions (Gaussians, Poisson), and how to calculate derivatives. Knowledge of linear algebra is also expected, and knowledge of mathematics underlying probability models will be useful. For the programming assignments, the student should have some background

in programming, and it would be helpful if the student had experience working with R/RStudio.

Student Learning Outcomes:

After completing this course, the student should be able to:

1. Develop an appreciation for what is involved in Learning models from data (ALL Projects)
2. Understand a wide variety of learning algorithms (ALL Projects)
3. Understand how to evaluate models generated from data (All Projects)
4. Apply the algorithms to a real problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models (All Projects)
5. Understand the difference between supervised and unsupervised Machine Learning (Projects 3,4,5,6,7)
6. Compute the inverse of a matrix (Project 1)
7. Compute the pseudo inverse of a matrix (Project 1)
8. Understand the difference between the inverse and pseudo inverse of a matrix (Project 1)
9. Use the Microsoft Azure AI platform to train a model to classify images (Project 2)
10. Use the R/R Studio statistical software to perform a regression analysis on a set of data (Project 6)
11. Understand the mathematical principles related to neural networks (vectors, matrices, and optimization). (Projects 3,4,5)
12. Understand how basic logic principles are applied to neural networks (and, or, not, xor) (Projects 3,4,5)
13. Use Sigmoid neurons for probabilistic classification (Projects 3,4,5)
14. Apply the k-means clustering algorithm to a dataset. (Project 7)
15. Apply basic programming skills and techniques using SQL (Project 7)
16. Understand generative AI (Project 1)
17. Navigate the ethical, compliance, and risk aspects associated with Generative AI (Projects 2, 3, 4)

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1.0 Course overview and description:

Program Goal

4.0 Required Reading and Textbook:

All required materials and resources will be available on the Canvas LMS. The student is required to check the announcements on the CANVAS LMS on a daily basis.

5.0 Course Requirements:

Project 1:	50 points
Project 2:	100 points
Project 3:	100 points
Project 4:	100 points
Project 5:	100 points
Project 6:	100 points
Project 7:	150 points
Total:	700 points

Total: 1000 points

Projects:

1. Student needs to complete courses on the GeoGebra platform and submit a lecture video with screen capturing software.
2. No credit will be given if the recording does not include audio and explanation of the concepts.

Rubric for Projects:

	Excellent	Average	Poor	Score
Understanding of mathematical concepts (30%)				
Understanding of coding concepts (50%)				
Professional decorum (Presentation/Audio/Quality of video, etc.) (20%)				

Technology requirements:

This is a 100% online course, and uses the A&M-Central Texas Canvas Learning Management System:

<https://tamuct.instructure.com/>

Every student is required to have access to a laptop/desktop and be able to use MS TEAMS for meetings. Here is a link to the meetings:

Click on the following link to meet with the instructor during her office hours or by appointment:

https://teams.microsoft.com/l/meetup-join/19:meeting_NDdjNTI1YzgtZmY1NS00ZWNiLWJhYzUtMjNkZThmMmE3MGEx@thread.v2/0?context=%7B%22Tid%22:%229eed4e30-00f7-4484-9ff1-93ad8005acec%22,%22Oid%22:%22fd507602-9cdc-4477-9774-38f1e2aad94e%22%7D

Use generative AI:

www.openAI.com

Brilliant learning platform:

<https://brilliant.org/classroom/join/6ky89r/>

Create a Microsoft Azure account at:

www.azure.microsoft.com

Grading Criteria Rubric and Conversion Posting of Grades

Grades will be available on the Canvas Gradebook.

Grading Policies

No late assignment will be accepted.

COURSE OUTLINE AND CALENDAR

Complete Course Calendar

	Monday	Tuesday	Wednesday	Thursday
Week 1	June 5th Watch the lecture video and PowerPoint presentation on Module 1	June 6th Download R and RStudio	June 7th Create a Microsoft Azure account	June 8th Sign in to Brilliant.org

Week 2	June 12th Project 1 due	June 13th	June 14th	June 15th
Week 3	June 19th Project 2 due	June 20st	June 21st	June 22nd
Week 4	June 26th Project 3 due	June 27th	June 28th	June 29th
Week 5	July 3rd Project 4 due	July 4th No class	July 5th	July 6th
Week 6	July 10th Project 5 due	July 11th	July 12th	July 13th
Week 7	July 17th Project 6 due	July 18th	July 19th	July 20th
Week 8	July 24th Project 7 due	July 25th	July 26th	July 27th

Important University Dates:

https://catalog.tamuct.edu/undergraduate_catalog/general-information/academic20calendars20and20final20exam20schedule/

TECHNOLOGY REQUIREMENTS AND SUPPORT

Student needs

- A computer and R/RStudio software.
- Internet connection for meetings on webex (with audio)
<https://tamuct.webex.com/join/dekock>
- Internet connection to access the website:
www.openai.com
www.brilliant.org
www.azure.microsoft.com

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

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?PartnerIdId=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.

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),
[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 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](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/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 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. For the Summer 2022 semester, the hours of operation are from 10:00 a.m.-4:00 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 most Saturdays from 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 [WOnline](https://tamuct.mywconline.com/) at [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.

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 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].

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.

OTHER POLICIES

No late assignments will be accepted in this class.

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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