

Math 5330-110, 80488, Mathematical Modeling

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 (please no text) and personal WhatsApp	(585) 204-0314
WhatsApp group	https://chat.whatsapp.com/KkIL66fV9TrBU52E8tz57Z
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	Here is my calendar: https://outlook.office365.com/owa/calendar/07dff314f48545bca12eb8d98eeaba7f@tamuct.edu/612754dc2a1549b3a317c5b26488442f10780913817289095896/calendar.html Please check when I am free (any time from 9 a.m. to 9 p.m.), Send me an email, and I will confirm by email.

COURSE INFORMATION

Course Objective or Goal: This course is an advanced introduction to mathematical models related to applied sciences. Particular models studied will vary from semester to semester. Possible applications include: natural language processing; genetic informatics; power systems modeling; epidemiology

Student Learning Outcomes

1. Upon successfully completing MATH 5330, students should be able to do the following:
2. Gain fluency in Python programming
3. Implement mathematical models of practical systems based on written and verbal descriptions, using mathematical software
4. Investigate properties of mathematical models both theoretically and experimentally using software.
5. Interpret theoretical and experimental results so as to provide accurate characterizations of model behavior.

Required Reading and Textbook(s)

All materials will be obtained online, including YouTube videos, pdf's, and web sites. Most pdf's will be made available in the course Google Drive.

COURSE REQUIREMENTS

Coursework

Students will turn in biweekly assignments. Assignments may consist of software, written reports, or oral reports. On alternate weeks, students will submit progress reports which may be oral or written. Each progress report will be worth 20 points (8 progress reports for a total of 160 points), and each assignment will be worth 80 points (8 assignments for a total of 640 points).

Rubrics for software, written reports, and oral reports are included below:

Software:

	1	2	3	4	5	
	Not evident	Attempted but not successful	Present but needs improvement	Present and effective	Goes beyond needs of most users	
Design						
The user is able to move throughout the application without repetition or confusion						0
The software is highly interactive						0
The application accommodates users based on a variety of abilities						0
						0
Total						0
Content						
The software correctly performs tasks it is designed for						0
Coding follows agreed-upon syntax and formatting standards						
Software is commented so that programmers can follow the logic						
Software has been thoroughly tested, and tests have been documented						0
Total						0
Interface						
Screen display designs are easy to read						0
Screen elements enhance, not distract from the content						0
The application is consistent in how all of its tasks are executed						0
Display is clean, simple, and attractive						0
Users have control over the navigation						0
Controls for manipulating the						0
Total						0
Documentation						
The user's manual is laid out in a logical manner						0
User's manual sufficiently covers the software's functions						0
User's manual uses clear, non-technical language whenever possible						0
Total						0
					Grand Total:	0

Written report:

CATEGORY	4	3	2	1
Introduction/ Thesis —	*exceptional introduction that grabs interest of reader and states topic. **thesis is exceptionally clear, arguable, well-developed, and a definitive statement.	*proficient introduction that is interesting and states topic. **thesis is clear and arguable statement of position.	*basic introduction that states topic but lacks interest. **thesis is somewhat clear and arguable.	*weak or no introduction of topic. **paper's purpose is unclear/thesis is weak or missing.
Quality of Information/ Evidence —	*paper is exceptionally researched, extremely detailed, and historically accurate. **information clearly relates to the thesis.	*information relates to the main topic. **paper is well-researched in detail and from a variety of sources.	*information relates to the main topic, few details and/or examples are given. **shows a limited variety of sources.	*information has little or nothing to do with the thesis. **information has weak or no connection to the thesis.
Support of Thesis/Analysis —	*exceptionally critical, relevant and consistent connections made between evidence and thesis. **excellent analysis.	*consistent connections made between evidence and thesis **good analysis.	*some connections made between evidence and thesis. **some analysis.	*limited or no connections made between evidence and thesis. **lack of analysis.
Organization/ Development of Thesis —	*exceptionally clear, logical, mature, and thorough development of thesis with excellent transitions between and within paragraphs.	*clear and logical order that supports thesis with good transitions between and within paragraphs.	*somewhat clear and logical development with basic transitions between and within paragraphs.	*lacks development of ideas with weak or no transitions between and within paragraphs.
Conclusion —	*excellent summary of topic with concluding ideas that impact reader. **introduces no new information.	*good summary of topic with clear concluding ideas. **introduces no new information.	*basic summary of topic with some final concluding ideas. **introduces no new information.	*lack of summary of topic.
Style/Voice —	**word choice is specific, purposeful, dynamic and varied. ***sentences are clear, active (subject-verb-object), and to the point.	**word choice is specific and purposeful, and somewhat varied throughout. ***sentences are mostly clear, active (SVO), and to the point.	**word choice is often unspecific, generic, redundant, and clichéd. ***sentences are somewhat unclear; excessive use of passive voice.	**word choice is excessively redundant, clichéd, and unspecific. ***sentences are very unclear.
Grammar/Usage/ Mechanics —	*control of grammar, usage, and mechanics. **almost entirely free of spelling, punctuation, and grammatical errors.	*may contain few spelling, punctuation, and grammar errors.	*contains several spelling, punctuation, and grammar errors which detract from the paper's readability.	*so many spelling, punctuation, and grammar errors that the paper cannot be understood.
Works Cited/Bibliography	* Entries complete and formatted correctly	* entries mostly correct with few omissions	* Frequent errors in citations	*Numerous errors.

Oral presentation:

	Poor 1-2 pts	Fair 3 pts	Good 4 pts	Excellent 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.

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.

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.
- All assignments address all Student Learning Outcomes listed above.

Course Calendar

Week	Assignments/Tasks	Due Date (Tuesdays)
1-2	Initial project / Python ramp-up	Sept 12, 2023
3-4	Hidden Markov Models, part 1	Sept 26, 2023
5-6	Hidden Markov Models, part 2.	Oct 10, 2023
7-8	LSTM Networks, part 1	October 24, 2023
9-10	LSTM Networks, part 2	November 7, 2023
11-12	Power systems modeling, part 1	November 21, 2023
13-14	Power systems modeling, part 2	December 5, 2023
15-16	Final project	December 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),
[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),
[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?PartnerIdpld=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](#) 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 [WOnline](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.

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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.