

**MATH 5330-110, CRN 80005, Mathematical Modeling
Fall 2021 rev. 08.21.21**

Texas A&M University-Central Texas

COURSE DATES, MODALITY, AND LOCATION

Aug 23, 2021 - Dec 10, 2021

The instructional method is online, and 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

Office Hours

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

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.

Fall 2021 Return to Campus Plan. For the most recent campus information regarding COVID-19 see the Texas A&M University-Central Texas [Fall 2021 Return to Campus Plan](https://www.tamuct.edu/covid19/) [<https://www.tamuct.edu/covid19/>]

COURSE INFORMATION

Course Overview and description In this course, students will investigate in depth a selected set of mathematical models that are commonly used in various scientific and engineering fields, which may include (but are not limited to) the following: epidemiology, data science, bioinformatics, operations research, and physics.

Course Objective

This class revisits the material that is covered in your previous calculus class, but at a much more rigorous, demanding level. Students will be expected to thoroughly master the concepts and techniques of 1-variable calculus. Students will be expected to have the ability to solve applied problems from scratch: i.e., given an applied problem, with no additional prompting the student can identify appropriate techniques and correctly employ them to obtain the solution.

Student Learning Outcomes

Upon successfully completing MATH 5330, students should be able to do the following:

- a) Given a scientific or engineering application, be able to locate on the Internet suitable documentation concerning mathematical models for the application.
- b) Gain a solid, intuitive understanding of foundational ideas in probability, linear algebra, and numerical analysis which are commonly used to construct mathematical models.
- c) Implement mathematical models of practical systems based on written and verbal descriptions, using mathematical software.
- d) Investigate properties of mathematical models both theoretically and experimentally using software.
- e) Interpret theoretical and experimental results so as to provide accurate characterizations of model behavior.
- f) For a given scientific or engineering application, be able to construct a suitable mathematical model based on sound modeling principles.

Required Reading and Textbook(s)

All course material will either be obtained online or provided by the instructor in lecture format.

COURSE REQUIREMENTS AND GRADING

The course will involve both guided topic exploration and projects. The student's proficiency in guided topics will be measured by computational and programming exercises posed by the instructor. Grading rubric for these is as follows:

100% Perfect, or inessential misprints

90% Shows complete understanding of the underlying concept or procedure -- careless, minor or technical mistakes

75% General understanding of the underlying concept or procedure -- significant progress towards solution (more than 75% complete)

50% Makes some progress towards solution (problem setup and some application of

relevant principles)

25% Shows some familiarity with relevant concepts.

Coursework also includes a project that will require a written report. The written report will be evaluated according to the following rubric:

<i>CATEGORY</i>	<i>4</i>	<i>3</i>	<i>2</i>	<i>1</i>
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.

Point values for the different course components are as follows:

Topic: Epidemiological models 15 points

Topic: Deep learning with Google Colab: 20 points

Project: 80 points

Total: 100 points

Posting of Grades

All submitted work will be graded within two weeks, and results posted on Canvas.

Grading Policies:

Points are converted to letter grades as follows: A ($x \geq 90.00$); B ($80 \leq x < 90$); C ($70 \leq x < 80$); D ($60 \leq x < 70$); F ($x \leq 60$), where x represents earned points.

Students within one grade point of the next letter grade will have their grades bumped up if they have completed all assignments.

Late work is accepted for full credit *only* with formal documentation. Acceptable reasons for late work include: serious illness (doctor's note required); family funeral (newspaper notification required). Late work related to genuine (but undocumented) family emergencies can receive at most 70% of the assignment's value. Other late work can receive at most 50% of the assignment's value.

COURSE OUTLINE AND CALENDAR

Complete Course Calendar

Topics are listed with the student learning outcomes (SLO) that they address. Each topic will have homework and/or a quiz, as most appropriate for the material.

Aug, 23-Sep. 5: Multicompartment epidemiological models (includes exercises) (SLO b,d,e)

Sep. 6-Sep 26: Deep learning with Google Colab (SLO b,c,d,e)

Sep. 27-Oct. 3: Project planning (SLO a,f)

Oct. 4-Dec 5: Project execution (all SLOs)

Dec. 6-10: Project wrapup (All SLOs)

Important University Dates

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

TECHNOLOGY REQUIREMENTS AND SUPPORT

Technology Requirements

Home access to a computer or tablet with reliable Internet connection is required. The computer must have full audio-visual capabilities (webcam, speaker/headphone and microphone).

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. Proctorio 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://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. 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 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/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, 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 .

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

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 Fall 2021 semester, 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 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 by making an appointment via WOnline 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. 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].