

Math 5377-110, 80085, Visualization Software

Fall 2022

Texas A&M University-Central Texas

COURSE DATES, MODALITY, AND LOCATION

August 22nd, 2022 – December 9th, 2022

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. Mienie Roberts

Office: HH Room 302-K

Virtual office: <https://tamuct.webex.com/meet/dekock>

Phone: 903.705.9703

Email: Preferred email is the Canvas Inbox. Student can also reach me at:
dekock@tamuct.edu

Office Hours

Mondays: 6pm-7pm

Wednesdays: 1pm-2pm

Or by appointment

Link to office hours: <https://tamuct.webex.com/meet/dekock>

Student-instructor interaction

The instructor will reply to emails within 24 hours. Please use the Canvas inbox for any email correspondence. If the student is in need of a synchronous session with the instructor, please meet with the instructor during her office hours or request a session via email. All synchronous sessions will be available at:

<https://tamuct.webex.com/join/dekock>

The instructor will post announcements with respect to the class to CANVAS announcements. It is the responsibility of the student to check the announcements on a daily basis.

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

Course Overview and description

This course will use the R/RStudio and Geogebra software to revisit and explain abstract mathematical concepts. The student will learn to use the R/RStudio package to mine, analyze, and visualize data. Students will also become proficient in using the Shiny package to build dashboards and web applications in R. Learn how to use “regular expressions” to describe search patterns.

Geogebra is dynamic software and can be used to explain abstract mathematical concepts via virtual manipulatives, sliders, etc. Students are required to have access to a computer/laptop and internet.

The student is also required to complete the following courses on datacamp.com:

Introduction to R

Cleaning data in R

Data Visualization in R

Intermediate R

Building web applications in R with Shiny: Case studies

Building dashboards with Shiny dashboard

Correlation and Regression

Course Objectives:

Student learning outcomes:

R

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

1. Perform arithmetic in R.
2. Assign variables in R
3. Distinguish between datatypes in R
4. Create and perform operations on matrices in R
5. Understand what is a factor and how to use it
6. Compare ordered factors

(Covered in Project 1 and Final)

7. Create a dataframe
8. Select elements from a dataframe
9. Sort a dataframe
10. Create and name a list
11. Select elements from a list
12. Add more elements to a list
13. Understand the data cleaning process
14. Understand the principles of tidy data
15. Be able to work with functions in tidy
16. Prepare data for analysis
17. Find missing values
18. Create a plot in R
19. Create a piechart
20. Use a histogram to visualize data

(Covered in Project 2 and Final)

21. Plot correlation matrices
22. Adding lines, points, and test to plots
23. Understand in which instances it is necessary to scale data
24. Use color in plots
25. Use the ggplot package

(Covered in Project 3 and Final)

26. Use conditional statements, loops, and functions to power your own R scripts
27. Make R code more efficient and readable using the apply functions

(Covered in Project 4 and Final)

28. Use regular expressions to describe pattern searches.
29. Work with times and dates

(Covered in Project 5 and Final)

30. Build a static dashboard in R using the Shiny package.
31. Fill a dashboard with static content

(Covered in Project 6 and Final)

32. Add dynamic content to a Shiny Dashboard

(Covered in Project 7 and Final)

33. Customize the style of a Shiny Dashboard

(Covered in Project 8 and Final)

34. Use the Shiny package to explore a dataset

(Covered in Project 9 and Final)

35. Use the Shiny package to generate a customized plot

(Covered in Project 10 and Final)

36. Use the Shiny package to create a wordcloud

(Covered in Project 11 and Final)

37. Understanding relationships among variables.

38. Exploring data with multiple variables

39. describe relationships between two numerical quantities

40. characterize relationships between numerical quantities graphically, in the form of summary statistics, and through simple linear regression models.

(Covered in Project 12 and Final)

GeoGebra

1. Understand how to visualize different functions in GeoGebra

2. How to use sliders to explain parameters in functions

3. Be able to import an image into GeoGebra

4. Overlay graphs onto the image

5. Explain symmetry with the trace function

(Covered in Project 1 and Final)

6. Use spreadsheets in GeoGebra

7. Find the mean, median, and standard deviation of a dataset.

8. Create and interpret a scatterplot

9. Create discrete and continuous probability distributions in GeoGebra

10. Find the area under the density

(Covered in Project 2 and Final)

- 11. Use GeoGebra to explain reflection and rotation of objects**
- 12. Use GeoGebra to explain Geometric concepts related to polygons**
- 13. Measure angles**
- 14. Calculate perimeter and area of polygons**
- 15. Use GeoGebra to create and explain properties of circles**
- 16. Calculate circumference and area of circles with GeoGebra**
- 17. Create a virtual manipulative to explain the Pythagorean theorem**

(Covered in Project 3 and Final)

- 18. Create a virtual manipulative to explain rate of change and the limit definition**

(Covered in Project 4 and Final)

- 19. Create a virtual manipulative to explain the definition of the integral in terms of Riemann sums.**

(Covered in Project 5 and Final)

- 20. Use GeoGebra to illustrate the definition of:**
 - A symmetric matrix**
 - An idempotent matrix**
 - The transpose of a matrix**
 - Diagonal of a matrix**
 - Upper triangular matrix**
 - Lower triangular matrix**

(Covered in Project 6 and Final)

- 21. Perform operations on matrices:**
 - Addition and subtraction of matrices**
 - Multiplication of a matrix**
 - Find an inverse of a matrix**
 - Find the rank of a matrix**
 - Find the determinant of a matrix**
 - Find the row Echelon form of a matrix**

(Covered in Project 7 and Final)

- 22. Plotting points and vectors**
- 23. Add and subtract vectors**
- 24. Drawing vectors**
- 25. Find the dot product of vectors**
- 26. Find the cross product of vectors**

(Covered in Project 8 and Final)

27. Draw conic sections

Ellips
Hyperbola
Parabola
Circles

(Covered in Project 9 and Final)

28. Use GeoGebra3D to draw 3D objects

29. Create the net of a 3D object

(Covered in Project 10 and Final)

30. Draw parametric curves.

31. Perform operations on parametric curves.

(Covered in Project 11 and Final)

32. Perform operations on Boolean variables and conditions

(Covered in Project 12 and Final)

The course will also use the GeoGebra software which can be found at:

www.GeoGebra.org

Students will be required to explain abstract mathematical concepts with the GeoGebra software by creating lecture videos by using screen capturing software (for example using the Studio software on Canvas).

Required Reading and Textbook(s)

No text is required for this course. Students are required to sign up for a datacamp account at:

www.datacamp.com

COURSE REQUIREMENTS

The student will be responsible for 12 projects and a proctored final exam.
Course Requirements: (include point values for each- not just a percentage)

Grading Criteria Rubric and Conversion

| | |
|------------|--------------|
| Project 1 | (20 points) |
| Project 2 | (30 points) |
| Project 3 | (50 points) |
| Project 4 | (50 points) |
| Project 5 | (50 points). |
| Project 6 | (50 points) |
| Project 7 | (50 points) |
| Project 8 | (50 points) |
| Project 9 | (50 points) |
| Project 10 | (100 points) |
| Project 11 | (100 points) |
| Project 12 | (100 points) |
| Final | (300 points) |

Posting of Grades

Student will receive feedback on progress on Canvas within a week. All grades will be available under the "Grades"-tab.

Grading Policies

No late assignments will be accepted in this class.

COURSE OUTLINE AND CALENDAR

Complete Course Calendar

| | Monday | Tuesday | Wednesday | Thursday |
|---------------|---------------------------------|----------------|------------------|-----------------|
| Week 1 | Aug 22 Sign up for datacamp | Aug 23 | Aug 24 | Aug 25 |
| Week 2 | Aug 29 Labor day No class | Aug 30 | Aug 31 | Sep 1 |
| Week 3 | Sep 5 | Sep 6 | Sep 7 | Sep 8 |

| | | | | |
|----------------|--------------------------|--------|--------|--------|
| | Project 1 due | | | |
| Week 4 | Sep 12 Project 2 due | Sep 13 | Sep 14 | Sep 15 |
| Week 5 | Sep 26 Project 3 due | Sep 27 | Sep 28 | Sep 29 |
| Week 6 | Oct 3 Project 4 due | Oct 4 | Oct 5 | Oct 6 |
| Week 7 | Oct 10 Project 5 due | Oct 11 | Oct 12 | Oct 13 |
| Week 8 | Oct 17 Project 6 due | Oct 18 | Oct 19 | Oct 20 |
| Week 9 | Oct 24 Project 7 due | Oct 25 | Oct 26 | Oct 27 |
| Week 10 | Oct 31 Project 8 due | Nov 1 | Nov 2 | Nov 3 |
| Week 11 | Nov 7 Project 9 due | Nov 8 | Nov 9 | Nov 10 |
| Week 12 | Nov 14 Project 10 due | Nov 15 | Nov 16 | Nov 17 |
| Week 13 | Nov 21 | Nov 22 | Nov 23 | Nov 24 |
| Week 14 | Nov 28 Project 11 due | Nov 29 | Nov 30 | Dec 1 |
| Week 15 | Dec 5 Project 12 due | Dec 6 | Dec 7 | Dec 8 |
| Week 16 | Dec 12 Final | Dec 13 | Dec 14 | Dec 15 |
| | | | | |

Important University Dates

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

TECHNOLOGY REQUIREMENTS AND SUPPORT

Student should have access to the datacamp website at:

www.datacamp.com

and the GeoGebra platform:

www.geogebra.org

Access office hours on Webex:

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

Use screen capturing software (for example Studio on Canvas) to record the projects.

Technology Requirements

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](https://tamuct.instructure.com/courses/717) 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?PartnerIdId=https://eis-prod.ec.tamuct.edu:443/samlso&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](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/bit) 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.

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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