

CIS 4340-110 - 80661- Algorithm Design and Analysis

Fall 2020

Texas A&M University - Central Texas

COURSE DATES, MODALITY, AND LOCATION

Course Dates: 24 August - 11 December

Modality: This is an independent study course that uses the A&M-Central Texas Canvas Learning Management System [<https://tamuct.instructure.com/>].

Location: N/A

INSTRUCTOR AND CONTACT INFORMATION

Instructor: Emmet Gray

Office: Founder Hall, Room 323Q

Phone: No office phone, COBA Admin - (254) 519-5437

Email: Canvas Inbox (preferred) or TAMUCT email (e.gray@tamuct.edu)

Office Hours:

I am available for "virtual" office hours via WebEx. Please contact me via Canvas to schedule a time to be online.

Mode of instruction and course access:

This is an independent study course with no lectures. It makes extensive use of the TAMUCT Canvas Learning Management System (<https://tamuct.instructure.com>). The course syllabus, schedule, supplemental readings, class announcements, power point slides, learning modules, homework assignments, exams and other course related documents will be posted on Canvas. Each student is responsible for the posted material, and should check Canvas several times a week for updates

Student-instructor interaction:

I typically respond to Canvas email within 24 hours except on weekends. I can meet with students (either virtually or face to face at the university) by appointment.

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>] 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.

COVID-19 SAFETY MEASURES

To promote public safety and protect students, faculty, and staff during the coronavirus pandemic, Texas A&M University-Central Texas has adopted policies and practices to minimize virus transmission. All members of the university community are expected to adhere to these measures to ensure their own safety and the safety of others. Students must observe the following practices while participating in face-to-face courses, course-related activities (office hours, help sessions, transitioning to and between classes, study spaces, academic services, etc.) and co-curricular programs:

- Self-monitoring—Students should follow CDC recommendations for self-monitoring. Students who have a fever or exhibit symptoms of COVID-19 should participate in class remotely and should not participate in face-to-face instruction. Students required to quarantine must participate in courses and course-related activities remotely and must not attend face-to-face course activities. Students should notify their instructors of the quarantine requirement. Students under quarantine are expected to participate in courses and complete graded work unless they have symptoms that are too severe to participate in course activities.
- Face Coverings— Face coverings must be worn inside of buildings and within 50 feet of building entrances on the A&M-Central Texas Campus. This includes lobbies, restrooms, hallways, elevators, classrooms, laboratories, conference rooms, break rooms, non-private office spaces, and other shared spaces. Face coverings are also required in outdoor spaces where physical distancing is not maintained. The university will evaluate exceptions to this requirement on a case by case basis. Students can request an exception through the Office of Access and Inclusion in Student Affairs.
 - If a student refuses to wear a face covering, the instructor should ask the student to leave and join the class remotely. If the student does not leave the class, the faculty member should report that student to the Office of Student Conduct. Additionally, the faculty member may choose to teach that day's class remotely for all students.
- Physical Distancing—Physical distancing must be maintained between students, instructors, and others in the course and course-related activities.
- Classroom Ingress/Egress—Students must follow marked pathways for entering and exiting classrooms and other teaching spaces. Leave classrooms promptly after course activities have concluded. Do not congregate in hallways and maintain 6-foot physical distancing when waiting to enter classrooms and other instructional spaces.
- The university will notify students in the event that the COVID-19 situation necessitates changes to the course schedule or modality.

COURSE INFORMATION

Course Overview and description:

Examine computer algorithms and learn to select appropriate algorithms for tasks within specific computing environments. Study searching and sorting algorithms for their importance in computing. Special emphasis on efficiency, readability, maintainability, advanced design and analysis techniques, advanced data structures, and graph algorithms.

Course Objective:

This course presents a comprehensive study of modern computer algorithms with emphasis on how to select the best algorithm for a task considering the specific computing environment. It examines searching and sorting algorithms for their importance into solving complex computing problems.

Student Learning Outcomes:

A student successfully completing this course will be able to:

- Calculate the theoretical relative efficiency of sorting algorithms with emphasis on "divide and conquer" sorts such as the quick sort.
- Calculate the actual relative efficiency of advanced sorting algorithms.
- Contrast the "divide and conquer" approach with other solutions to programming problems.
- Employ recursion as it applies to binary search and quick sort.
- Diagram graphs as mathematical representations of networks. Review graph manipulation algorithms including spanning tree and shortest path traversal algorithms.
- Implement a program to find the shortest path in a graph.
- Contrast the use of heuristic methods as "good enough" methods to attack otherwise unsolvable problems.
- Apply the "NP-Completeness" theorem to the identification of intractable problems.
- Evaluate Finite State Automata, Push Down Automata, and Turing Machines as models of computers executing algorithms.

Competency Goals Statements (certification or standards):

Section not used

Required Reading and Textbook(s):

Required:

Analysis of Algorithms, 2nd Edition
Author: Jeffery McConnell
Edition: 2nd
Publisher: Jones & Barrett Learning
ISBN: 978-0-7637-0782-8

Note: An electronic version of the books may be available.

Note: A student of this institution is not under any obligation to purchase a textbook from a university-affiliated bookstore. The same textbook may also be available from an independent retailer, including an online retailer.

Supplemental Material:

The course textbook will be supplemented with other materials including lecture notes, handouts, oral presentations, industry articles, research paper readings, case studies, Power Point presentations etc.

Required Reading:

The student is expected to read and review all material presented in the assigned chapter prior to class.

COURSE REQUIREMENTS

Course Requirements

Examinations: There will be two exams, one midterm and one final exam. Each is worth 15 points. The midterm covers chapters 1-6a, and the final covers chapters 6b-12. Exams will be completed in one session and will be timed.

Assignments: There will be 6 take-home assignments. Each assignment will be worth 5 points. Assignments will typically be available on Canvas for 12 day. Multiple submissions are typically allowed.

Term Project: There will be 1 term project that will be worth 40 points. This assignment will typically be available on Canvas for 26 days.

Point Scores: The final grade for the course will be based upon the following:

Item	Quantity	Points	Total	Percent
Exams	2	15.00	30.0	30%
Assignments	6	5.00	30.0	30%
Term Project	1	40.00	40.0	40%
Total			100.0	100%

Grading Criteria Rubric and Conversion

Exams & Quizzes: Exams and quizzes will receive a numeric score (0-100) each. Scores will be converted to points and totaled as shown in the example below:

Quiz	Score	Percent	Max Points	Points
Quiz 1	95	95%	5.00	4.75
Quiz 2	100	100%	5.00	5.00
Quiz 3	80	80%	5.00	4.00
Quiz 4	85	85%	5.00	4.25
Quiz 5	86	86%	5.00	4.30
Quiz 6	88	88%	5.00	4.40

Requirements for Assignments: Assignments must follow the requirements as stated in the Canvas assignment system; demonstrate the concepts; get proper results; be organized, use comments, and use best practices.

The following grading rubric is used for assignments:

Criterion	% of Grade	Excellent (100%)	Adequate (80%)	Poor (60%)	Not Met (0%)
Assignment Requirements	15%	Meets all of the requirements of the assignment	Minor details of the requirements are missing	Significant details of the requirements are missing	Significant portions of the requirements are missing
Chapter Specific Objectives	30%	Fully demonstrates the concepts of the chapter	Applies major and minor concepts of the chapter	Applies major concepts of the chapter	Chapter concepts not in evidence
Compiles / Runs /Gets proper results	25%	No Compile Errors, Runs Correctly, Gets Proper Results	Minor run-time errors, Gets Proper Results	Minor run-time errors, does not produce proper results	Does not compile
Readable / Organized	15%	Code is well organized, easy to understand, good naming conventions	Minor issues with formatting, naming conventions	Majority of assignment has formatting or naming convention issues	No formatting or variable naming conventions
Comments	10%	Meaningful comments where needed	A few places where comments are missing	Complicated sections with no meaningful comments	No comments present
Efficient Coding	5%	No design-time messages, uses best practices	Few design-time messages, uses best practices on majority of opportunities	Several design-time messages, uses best practices most of the time	No evidence of any best practices

Conversion: Numeric scores are converted to letter grades as follows:

Note: I do not round up numeric scores

Grade	Points	Percent
A	90 - 100 points	90 - 100%
B	80 - 89 points	80 - 89%
C	70 - 79 points	70 - 79%
D	60 - 69 points	60 - 69%
F	0 - 59 points	0 - 59%

File Naming Convention: Submit your assignments via Canvas using file names with the following format:

CIS4340 [AssignmentID] [LastName.FirstName].[extension]

Example:

Posting of Grades: All student grades will be posted on the Canvas Grade Book and students should monitor their grading status through this tool. Grades will be posted within 7 days after of the due date.

Late Policy: Exams, Quizzes, and Assignments are due by midnight on the date assigned in Canvas. Typically, this is 11:59 PM each Friday. A 5-point penalty will be assessed for each day a requirement is late.

COURSE OUTLINE AND CALENDAR

Complete Course Calendar

Week	Date	DOW	Class Activity	What's Due	Notes
1	08/28/2020	Fri	Chapter 1		
2	09/04/2020	Fri	Chapter 2	Assignment 1	
3	09/11/2020	Fri	Chapter 3		
4	09/18/2020	Fri	Chapter 4	Assignment 2	
5	09/25/2020	Fri	Chapter 4		
6	10/02/2020	Fri	Chapter 5	Assignment 3	
7	10/09/2020	Fri	Chapter 6		
8	10/16/2020	Fri	Midterm Review	Midterm Exam	Midterm
9	10/23/2020	Fri	Regular Expressions	Assignment 4	
10	10/30/2020	Fri	Chapter 7		
11	11/06/2020	Fri	Chapter 8	Assignment 5	
12	11/13/2020	Fri	Chapter 8		
13	11/20/2020	Fri	Chapter 9	Assignment 6	
14	11/27/2020	Fri	Chapter 10		
15	12/04/2020	Fri	Chapter 11	Term Project	
16	12/11/2020	Fri	Final Review	Final Exam	Final

University Calendar

Date	Activity
01/13/2020	Classes Begin for Spring Semester
01/15/2020	Deadline for Add, Drop, and Late Registration for 16- and First 8-Week Classes
01/20/2020	Martin Luther King, Jr Day (University Closed)
01/21/2020	Deadline to Drop First 8-Week Classes with No Record
01/29/2020	Deadline to Drop 16-Week Classes with No Record
02/21/2020	Deadline to Drop First 8-Week Classes with a Quit (Q) or Withdraw (W)
03/01/2020	Deadline for Teacher Education and Professional Certification Applications
03/06/2020	Classes end for 1st 8-Weeks
03/09/2020	Spring Break (No Classes - Administrative Offices Open)
03/10/2020	Spring Break (No Classes - Administrative Offices Open)
03/11/2020	Spring Break (No Classes - Administrative Offices Open)
03/12/2020	Spring Break (No Classes - Administrative Offices Open)
03/13/2020	Spring Break (University Closed)
03/10/2020	Deadline for Faculty Submission of First 8-Week Final Class Grades (due by 3pm)
03/15/2020	Deadline for Clinical Teaching/Practicum Applications
03/16/2020	Add, Drop, and Late Registration Begins for Second 8-Week Classes
03/16/2020	Classes Begin for Second 8-Week Session
03/16/2020	Class Schedule Published for Summer Semester
03/18/2020	Deadline for Add, Drop, and Late Registration for Second 8-Week Classes
03/23/2020	Deadline to Drop Second 8-Week Classes with No Record
03/27/2020	Deadline for Graduation Application for Ceremony Participation
03/30/2020	Registration Opens for Seniors for Summer Semester
04/03/2020	Deadline to Drop 16-Week Classes with a Quit (Q) or Withdraw (W)
04/06/2020	Registration opens for all students for the Summer and Fall Semesters
04/24/2020	Deadline to Drop Second 8-Week Classes with a Quit (Q) or Withdraw (W)
05/08/2020	Deadline for Applications for Tuition Rebate for Spring Graduation (5pm)
05/08/2020	Deadline for Degree Conferral Applications to the Registrar's Office
05/08/2020	Deadline to Withdraw from the University for 16- and Second 8-Week Classes
05/08/2020	Spring Semester Ends
05/09/2020	Spring Commencement Ceremony

TECHNOLOGY REQUIREMENTS AND SUPPORT

Technology Requirements.

You will need to create Microsoft Word and Excel documents.

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>

Please let the support technician know you are an A&M-Central Texas student.

Technology issues are not an excuse for missing a course requirement – make sure your computer is configured correctly and address issues well in advance of deadlines.

COURSE AND UNIVERSITY RESOURCES, PROCEDURES, AND POLICIES

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. Academic integrity is defined as a commitment to honesty, trust, fairness, respect, and responsibility. Any deviation by students from this expectation may result in a failing grade for the assignment and potentially a failing grade for the course. Academic misconduct is any act that improperly affects a true and honest evaluation of a student's academic performance and includes, but is not limited to, working with others in an unauthorized manner, cheating on an examination or other academic work, plagiarism and improper citation of sources, using another student's work, collusion, and the abuse of resource materials. All academic misconduct concerns will be referred to the university's Office of Student Conduct. Ignorance of the university's standards and expectations is never an excuse to act with a lack of integrity. 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](#) 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/index.html) [<https://www.tamuct.edu/student-affairs/index.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, 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

The University Writing Center (UWC) at Texas A&M University–Central Texas (TAMUCT) is a free service open to all TAMUCT students. For the Fall 2020 semester, all services will be online as a result of the COVID-19 pandemic. The hours of operation are from 10:00 a.m.-5:00 p.m. Monday thru Thursday with satellite hours online Monday thru Thursday from 6:00-9:00 p.m. The UWC is also offering hours from 12:00-3:00 p.m. on Saturdays. Tutors are prepared to help writers of all levels and abilities at any stage of the writing process. 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. While tutors will not write, edit, or grade papers, they will assist students in developing more effective composing practices. 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 and/or need any assistance with scheduling.

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 250,000 eBooks and 82,000 journals, in addition to the 85,000 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 on Skype 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].

For Fall 2020, all reference service will be conducted virtually. Please go to our [Library website](http://tamuct.libguides.com/index) [http://tamuct.libguides.com/index] to access our virtual reference help and our current hours.

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 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/student-affairs/bat.html) website for more information [<https://www.tamuct.edu/student-affairs/bat.html>]. If a person's behavior poses an imminent threat to you or another, contact 911 or A&M-Central Texas University Police at 254-501-5800.

INSTRUCTOR POLICIES

Policies related to absence, grading, etc.

- You are responsible for all class material presented during an absence.
- All work is submitted through Canvas and due on the specified due date/time.
- A penalty of 5 points per day is applied to late Exams, Quizzes, and Assignments.
- Most assignments can be submitted multiple times, even after grading
- Late penalties are also applied to resubmitted items
- Missed exams, quizzes, and assignments will receive a grade of zero.

My Personal Statement

- You will receive feedback in the form of graded assignments within 7 days after the due date.
- I want you to read the feedback that I provide to you (your personal grading notes, Canvas emails, and Canvas discussion forums).
- I am almost always available via email and typically respond within 24 hours except on weekends.
- I prefer email over phone conversations

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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