

CSCI 2436:001 DATA STRUCTURES

Spring 2025

Instructor:	Dr. Zechun Cao	Time:	TR 3:30 – 4:45 PM
Office:	STEC 211N	Place:	STEC 261
Email:	zcao@tamusa.edu	CRN:	22792

Course Website: Blackboard (<http://tamusa.blackboard.com>)

Office Hours: TR 1:30 – 3:30 PM, and by appointment.

Catalog Course Description: This course introduces the fundamental concepts of data structures and expands on the concepts control structure, data types and algorithms. Topics include recursion, fundamental data structures (including stacks, queues, linked lists, hash tables, trees, and graphs), and algorithmic analysis. Includes basic analysis of algorithms, searching and sorting techniques, and an introduction to software engineering. Course includes lab component for lab-based exercises. TSI Restriction(s): Reading, Math, and Writing.

Course Objectives: The objective of the course is to provide a broad understanding of fundamental data structures and the basic concepts of efficiency in algorithm development including recursions, linked lists, stacks, queues, trees, hash tables, sorting and searching algorithms, and graphs.

Prerequisites: Grade of C or better in each of: MATH 1314, CSCI 1436 (or CSCI 1136 and CSCI 1336), CSCI 1437 (or CSCI 1137 and 1337). Students who do not meet the pre-requisites must contact the instructor immediately.

Learning Outcomes: After successful completion of this course, students will be able to:

1. Analyze different algorithms and compare the efficiency of the algorithms.
2. Analyze different computing problems and identify solutions of the problems.
3. Understand and implement various data structures including linked list, stack, and queue data structures.
4. Understand and implement various sorting algorithms and compare their efficiency.
5. Develop complex problem-solving skills with recursions.
6. Understand the concepts of trees and implement trees including binary search trees.
7. Understand what hashing is and for what hashing is applied.

ABET Assessment: The Department of Computing and Cyber Security is in the planning process of applying for ABET accreditation for its BS in computer science program for which this course is a core course. As part of that process, students will be assessed on program level outcomes based on course outcomes from this course, and hence students must follow the necessary rigor to ensure mastery of the above course outcomes. For this course the following student learning outcomes will be assessed:

- **Student Outcome 1:** Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

Required Materials:

- **Textbook:** *Data Structures and Abstractions with Java*, 5th Edition, Pearson, by Frank M. Carrano and Timothy M. Henry, ISBN-13: 978-0-13-483169-5. To access ebook, follow directions from ebook vendor.

- **Computer Hardware/Software:** To participate in this course, you will need a computer with an internet connection, a microphone, headphones or speakers, and a webcam. You will need specific software to complete the classwork, such as IntelliJ, MS Office, and a web browser.
- **Blackboard:** You will have lecture notes, solutions to problems, multimedia materials, and other supplementary materials in Blackboard. All class announcements will be through Blackboard, and students should monitor this several times daily.
- **Time Expectation for Coursework:** You are expected to spend 4-8 hours per week on the course. Based on the background, some students may require more time. Time spent may be longer when assignments/exams are due.

Grading Policy:

Attendance	8%
Homework #1	8%
Homework #2	8%
Homework #3	8%
Homework #4	8%
Exam #1	20%
Exam #2	20%
Final Exam	20%

The final letter grades will be assigned as follows: 90% – 100% → A; 80% – 89% → B; 70% – 79% → C; 60% – 69% → D; Below 60% → F. This course has a requirement of a grade of C in both the lecture and lab components as a minimal grade for satisfactory completion of this course.

Tentative Class Schedule:*

- **Outline:***

Chapter 4	≈ 1 week
█ The Efficiency of Algorithms	
Chapter 5-6	≈ 3 weeks
█ Stacks and Implementations	
Chapter 7-8	≈ 2.5 weeks
█ Queues, Deques, and Priority Queues and Implementations	
Chapter 20-21	≈ 2.5 weeks
█ Dictionaries and Implementations	
Chapter 22-23	≈ 2.5 weeks
█ Introducing Hashing and Implementing Dictionaries with Hashing	
Chapter 24-25	≈ 2.5 weeks
█ Trees and Implementations	
Chapter 29-30	≈ 2 weeks
█ Graphs and Implementations	

- **Important Dates:***

Homework #1 Due	February 16th
Exam #1	February 20th
Homework #2 Due	March 9th
No Class, Spring Break	March 11th, 13th
Homework #3 Due	March 30th
Exam #2	April 3rd
Homework #4 Due	May 4th
Final Exam	2-3:30 PM, May 8th

*Instructor may change this schedule during the semester.

Other Key Dates: The complete academic calendar is available at the university [website](#).

Generative AI Policy: Use of artificial intelligence (AI) tools, including ChatGPT, is permitted in this course for students who wish to use them. To adhere to our scholarly values, students must cite any AI-generated material that informed their work (this includes in-text citations and/or use of quotations, and in your reference list). Using an AI tool to generate content without proper attribution qualifies as academic dishonesty and violates Texas A&M-San Antonio's standards of academic integrity.

Class Policy:

- **Examinations:** There will be mandatory exams, including the final exam (as per university schedule). Being absent/non-submission of an exam will result in a grade of zero for that exam and may result in a fail grade in the course. The exams may be in-person or online, and proctored by the instructor. The exams may consist of conceptual multiple-choice questions, problem-solving questions, and short essay questions. The exam materials will come from lecture notes, the text, and class discussions. Questions will emphasize understanding and applications of concepts and topics covered in class.
- **Team Project:** For the team course project(s), teams will be required to submit a confidential evaluation assessing their own performance and that of their teammates. These evaluations will factor into the calculation of individual project grades.
- **Coursework:** For coursework, including homework, assignment, project, lab, etc., the due dates will be posted through Blackboard. You must type your answers and turn in the electronic copy, no handwritten or scan of the handwritten work will be accepted. The submission must be through Blackboard. All intermediate work of the problem solution steps must be shown. This includes the use of the units of measurement, formula, the values substituted in the formulas for problem solution, as well the intermediate steps of the arithmetic computation. Considerable points will be taken off for not following these requirements. You must work independently on all the coursework. All submitted program codes will be checked by a plagiarism detection algorithm. You are encouraged to discuss concepts and ideas with your classmates but never look at another student's code or answers. Violations will result in a zero grade on the submitted work and other serious consequences.
- **Late and Makeup Policy:** Late and makeup submissions will NOT be accepted for any missed coursework or exam. Late submissions or makeups may be accepted/administered only in extraordinary circumstances, such as an excused official university activity, a severe illness, or a dire emergency. However, you must provide comprehensive and official documentation either before or within 5 days of the missed coursework or exam. All coursework has a clearly indicated due date and will receive full credit only if they are turned in by the due date. All submissions are due at 11:59 pm on their due date. Under the approval of the instructor, the late penalty for all coursework and makeup exams applies as follows. All submissions and makeup exams that are late up to 1 day lose 10% of the maximum grade, 1 to 2 days 20% of the maximum, and 2 days to 1 week lose 30% of the maximum. Submissions more than 1 week late will not be accepted.

Course Requirements:

1. Students should check the Course Calendar, Announcements, and Messages (e-mail) systems in Blackboard on a regular basis.
2. Students should keep current with all course assignments, quizzes, and examinations.
3. If the course uses remote proctoring for exams, students must schedule their exam early in the semester.
4. Students should ask questions and communicate with the instructor either in class, online, off-line or during office hours.

5. For all classwork, exams, quizzes etc., if a student is completing it off-campus, then they are responsible for availability of internet connectivity. Extensions will not be granted for lack of availability of internet connections.
6. Students should remember that online and hybrid courses assume greater responsibility and independent learning skills by the student for their own learning outcomes.
7. For online courses, students should keep current on class recordings, if not attending the live class (either in person or online).
8. For online asynchronous courses, there will be no online class sessions. All materials will be made available through Blackboard or through online links.
9. For online synchronous courses, there will be online class sessions as indicated. Students are expected to attend the online session at the given time. If a student is unable to attend a session, instructor will make the recording of the session available for the student to view. All materials will be made available through Blackboard or through online links.

Class Conduct and Civility Code: Everyone in class is expected to follow all rules in the student handbook, as well as common courtesy during classroom lectures and discussions in class and online, including the following:

1. Attendance may be taken by an appropriate method by the instructor.
2. It is the students' responsibility to obtain and be able to use the required materials and software for this class.
3. Student must retain copies of all assignments and graded work for verification purposes and provide it to the instructor, if necessary. Keep own copies of all computer files and e-mails till final grade is received.
4. Talking while the instructor is lecturing is extremely disruptive and discourteous to the instructor and other students.
5. Using computers or phones (except for a valid urgent need) during class for a purpose not related to class is disruptive. All cell phones and gadgets should be turned OFF.
6. For any questions about the exams and assignments, a student should contact the instructor, well in advance of the day they are due, so the instructor may have enough time to provide feedback.
7. All communications will be via e-mail communications to the Texas A&M University e-mail account, and students are expected to use their school provided email account. The instructor will reply to a student e-mail messages and voice messages within 2 business days (Monday-Friday).
8. All assignment submissions must be uploaded as instructed by the due date and time. Submission window may close or marked late, even if late by one second.

Anyone violating these policies may be subject to disciplinary actions.

Class Attendance and Participation: A vital part of every student's education is regular attendance of class meetings (for face-to-face/hybrid classes/online synchronous classes) or regular review of class materials posted by the instructor for asynchronous classes. Any absences tend to lower the quality of a student's work, and frequent or persistent absences may result in a failing grade. Students are responsible for the materials covered in class. The course covers a lot of material and most students find at least some parts of it difficult. Class participation is highly encouraged as it makes the class more interesting and enhances the learning experience. Students are strongly encouraged to ask questions, participate in class discussions and problem solving, and visit/contact the instructor during office hours in case of questions or concerns. Good attendance and participation will be rewarded when final grades are assigned.

The course is intensive and challenging and you are expected to master the materials presented in class. The structure of the class makes your individual study and preparation outside of class extremely important, and may vary considerably based on student background. However, a minimum of two hours of work outside the class is expected for every one hour of class period per week. Reading the assigned chapter(s) and having some familiarity with them before class will be very useful for understanding lectures.

Financial Aid and Verification of Attendance: According to the following federal regulation, 34 CFR 668.21: U.S. Department of Education (DoE) Title IV regulation, a student can only receive Title IV funds based on Title IV eligibility criteria which include class attendance. If Title IV funds are disbursed to ineligible students (including students who fail to begin attendance), the institution must return these funds to the U.S. DoE within 30 days of becoming aware that the student will not or has not begun attendance. Faculty will provide the Office of Financial Aid with an electronic notification if a student has not attended the first week of class. Any student receiving federal financial aid who does not attend the first week of class will have their aid terminated and returned to the DoE. Please note that any student who stops attending at any time during the semester may also need to return a portion of their federal aid.

Counseling/Mental Health Resources: As a college student, there may be times when personal stressors interfere with your academic performance and/or negatively impact your daily functioning. If you are experiencing emotional difficulties or mental health concerns, support is available to you through the Student Counseling Center (SCC). To schedule an appointment call 210-784-1331 or visit Madla 120.

All mental health services provided by the SCC are free and confidential (as the law allows). The Student Counseling Center provides brief individual and group therapy, crisis intervention, consultation, case management, and prevention services.

Crisis support is available 24/7 by calling the SCC at 210-784-1331 (after-hours select option '2'). For more information, please visit www.tamusa.edu/studentcounseling

In a crisis situation, please walk-in to the Student Counseling Center (SCC) any time between the hours of 8:00 AM and 5:00 PM, Monday - Friday, to be seen by a clinician. For after-hours support, please call 210-784-1331. Please contact UPD at 911 if harm to self or harm to others is imminent.

Jaguar Writing Center: The Jaguar Writing Center provides writing support to graduate and undergraduate students in all three colleges. Writing tutors work with students to develop reading skills, prepare oral presentations, and plan, draft, and revise their written assignments. Students can schedule appointments with the Writing Center in JagWire under the student services tab. More information about what services we offer, how to make an appointment, and how to access your appointment can be found on our [website](#). The Writing Center can also be reached by emailing writingcenter@tamusa.edu.

Academic Learning Center: All currently enrolled students at Texas A&M University-San Antonio can utilize the Academic Learning Center for subject-area tutoring. The Academic Learning Center is an appointment based center where appointments are made through the Navigate platform. Students access Navigate through Jagwire in the Student Services tab. The Center is active on campus outreaching to students to highlight services offered. You can contact the Academic Learning Center by emailing tutoring@tamusa.edu or calling (210)-784-1332. Appointments can also be made through JagWire under the services tab.

University Email Policy and Course Communications: All correspondence between professors and students must occur via University email accounts. You must have Jaguar email account ready and working. If it is not working, contact the help desk at 210-784-4357.

Meeting Basic Needs: Any student who has difficulty affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to contact the Dean of Students (DOS@tamusa.edu) for support. In addition, you may notify the instructor if you are comfortable doing so.

Military Affairs: Veterans and active-duty military personnel are welcomed and encouraged to communicate, in advance if possible, about special circumstances (e.g., upcoming deployment, drill requirements, disability accommodations). You are also encouraged to visit the Patriots' Casa in-person, Room 202, or to contact the Office of Military Affairs with any questions at military@tamusa.edu or (210)784-1397.

Religious Observances: Texas A&M University-San Antonio recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holidays according to their tradition. Under A&M System policy, students are provided an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance provided they notify their instructors before the end of the second week of classes for regular session classes.

Pregnant/Parenting Students: Texas A&M-San Antonio does not require a pregnant or parenting student, solely because of that status or issues related to that status, to (1) take a leave of absence or withdraw from their degree or certificate program; (2) limit the student's studies; (3) participate in an alternative program; (4) change the student's major, degree, or certificate program; or (5) refrain from joining or cease participating in any course, activity, or program at the University. The university will provide reasonable accommodations to pregnant students that would be provided to a student with a temporary medical condition and that are related to the health and safety of the student and the student's unborn child. These could include maintaining a safe distance from substances, areas, and activities known to be hazardous to pregnant individuals and their unborn child; excused absences because of illness or medical appointments; modified due dates for assignments; rescheduled tests/exams; taking a leave of absence; and being provided access to instructional materials and video recordings of lectures for excused absences, if these would be provided to any other student with an excused absence. Pregnant/parenting students are encouraged to contact the Title IX Coordinator with any questions or concerns related to their status (titleix@tamusa.edu; 210-784-2061; CAB 439K).

Texas A&M-San Antonio has also designated the Title IX Coordinator as the liaison officer for current or incoming students who are the parent or guardian of a child younger than 18 years of age. The Title IX Coordinator can provide students with information regarding support services and other resources.

The Six-Drop Rule: Students are subject to the requirements of Senate Bill (SB) 1231 passed by the Texas Legislature in 2007. SB 1231 limits students to a maximum of six (6) non-punitive course drops (i.e., courses a student chooses to drop) during their undergraduate careers. A non-punitive drop does not affect the student's GPA. However, course drops that exceed the maximum allowed by SB 1231 will be treated as "F" grades and will impact the student's GPA.

Drop Policy: You may drop the course with an automatic grade of W on or before the date listed in the academic calendar at www.tamusa.edu. The last date to drop a course, or withdraw from the University is also indicated in the academic calendar on the university website (www.tamusa.edu). If you wish to drop the class, you must submit the necessary paperwork to the proper authority. Students dropping a course are subject to all conditions listed in the university catalog.

Academic Accommodations for Persons with Disabilities: The Americans with Disabilities Act of 1990, as amended, and the Rehabilitation Act of 1973 are federal anti-discrimination statutes that provide comprehensive civil rights protection for individuals with disabilities. Title II of the ADA and Section 504 of the Rehabilitation Act require that students with disabilities be guaranteed equal access to the learning environment through the provision of reasonable and appropriate accommodations of their disability. If you have a disability that may require an accommodation, please contact Disability Support Services (DSS) for the coordination of services. The phone number for DSS is (210) 784-1335 and email is dss@tamusa.edu.

Emergency Preparedness: JagE Alert is Texas A&M University-San Antonio's mass notification. In the event of an emergency, such as inclement weather, students, staff and faculty, who are registered, will have the option to receive a text message, email with instructions and updates. To register or update your information visit: <https://tamusa.bbcportal.com/>.

More information about Emergency Operations Plan and the Emergency Action Plan can be found [here](#) and [here](#).

Download the SafeZone App for emergencies or call (210) 784-1911. Non-Emergency (210) 784-1900

Statement of Harassment and Discrimination: Texas A&M University-San Antonio is committed to the fundamental principles of academic freedom, equality of opportunity, and human dignity. To fulfill its multiple missions as an institution of higher learning, A&M-San Antonio encourages a climate that values and nurtures collegiality, diversity, pluralism, and the uniqueness of the individual within our state, nation, and world. All decisions and actions involving students and employees should be based on applicable law and individual merit. Texas A&M University-San Antonio, in accordance with applicable federal and state law, prohibits discrimination, including harassment, on the basis of race, color, sex, religion, national origin, age, disability, genetic information, veteran status, sexual orientation, gender identity, or gender expression. Individuals who believe they have experienced harassment or discrimination prohibited by this statement are encouraged to contact the appropriate offices within their respective units.

Texas A&M University-San Antonio faculty are committed to helping create a safe learning environment for all students and for the university as a whole. If you have experienced any form of sex- or gender-based discrimination or harassment, including sexual assault, sexual harassment, domestic or dating violence, or stalking, know that help and support are available. A&M-San Antonio has staff members trained to support survivors in navigating campus life, accessing health and counseling services, providing academic and housing accommodations, and more. The university strongly encourages all students to report any such incidents to the university. Please be aware that all A&M-San Antonio employees (other than those designated as confidential resources such as counselors and other healthcare providers) are required to report information about such discrimination and harassment to the university. This means that if you tell a faculty member about an incident of sexual harassment or sexual violence, or other related misconduct, the faculty member must share that information with the university's Title IX Coordinator. If you wish to speak to a confidential employee who does not have this reporting responsibility, you can contact the Student Counseling Center at (210) 784-1331, Modular C.

Students' Rights and Responsibilities: The purpose of the following statement is to enumerate the essential provisions of students' freedoms and responsibilities to learn at Texas A&M University-San Antonio. All students are required to follow all policies and regulations as set forth by The Texas A&M University System, including the A&M-San Antonio Student Code of Conduct.

Students' Rights

1. A student shall have the right to participate in a free exchange of ideas, and there shall be no university rule or procedure that in any way abridges the rights of freedom of speech, expression, petition, and peaceful assembly as set forth in the U.S. Constitution.
2. Each student shall have the right to participate in all areas and activities of the university, free from any form of discrimination, including harassment, on the basis of race, color, national or ethnic origin, religion, sex, disability, age, sexual orientation, gender identity, gender expression, genetic information, or veteran status in accordance with applicable federal and state laws.
3. A student has the right to personal privacy except as otherwise provided by law, and this will be observed by students and University authorities alike.
4. Each student subject to disciplinary action arising from violations of university student rules shall be assured a fundamentally fair process.

Students' Responsibilities

1. A student has the responsibility to respect the rights and property of others, including other students, the faculty and staff, and the administration.
2. A student has the responsibility to be fully acquainted and compliant with the University Student Rules found in the Student Handbook, Student Code of Conduct, on our website, and in the University Catalog.

3. A student has the responsibility to recognize that student actions reflect upon the individuals involved and upon the entire University community.

Violations of Academic Conduct (Section 14.5 Student Handbook): As a member in an academic community, students at Texas A&M University-San Antonio are expected to exhibit a high level of honesty and integrity in their pursuit of higher education, be mature, be self-directed and be able to manage their own affairs. Students who are unwilling to abide by these basic expectations will find themselves facing academic and/or disciplinary sanctions. Students are expected to share in the responsibility and authority with faculty and staff to challenge and make known acts that violate the Texas A&M University-San Antonio Code of Conduct. For more information please visit the Office of Student Rights & Responsibilities [website](#).

Students engaging in an act that violates the standards of academic integrity will find themselves facing academic and/or disciplinary sanctions. Academic misconduct is any act, or attempt, which gives an unfair advantage to the student. Additionally, any behavior specifically prohibited by a faculty member in the course syllabus or class discussion may be considered as academic misconduct. Academic misconduct includes, but is not limited to, cheating, plagiarism, multiple submissions, collusion, lying and bribery. For more information, refer to the Student Code of Conduct, Article III: Conduct Rules and Regulations. Texas A&M University-San Antonio faculty has the discretion to impose grade penalties as deemed necessary.

Faculty members are required to report such serious breaches of academic honesty to their chair, their dean and the Office of Student Rights and Responsibilities. In cases of academic misconduct, students may be subject not only to grade sanctions in courses but to disciplinary action. Grade sanctions may be imposed only by faculty members, but suspension or expulsion may be imposed only by the Vice President for Student Affairs. If a student wishes to appeal the decision of suspension or expulsion due to violations of academic misconduct, they must initiate their appeal as outlined within the Student Code of Conduct. Extenuating circumstances may cause the University to deviate from the defined time frames.

All student term papers and other written assignments are subject to analysis by anti-plagiarism software. Posting of any class work given to student, or solutions, or discussion, on publicly accessible forums or on social media is not permissible.

Considering the potential consequences of academic misconduct, it is obviously in students' best interests to avoid even the appearance of such behavior. If a student is unclear whether a specific act might constitute academic misconduct, please she/he should contact the instructor for an assessment of the situation.