

CSCI 2436:001 DATA STRUCTURES

Fall 2025

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| Instructor: | Dr. Zechun (Jacob) Cao | Time: | TR 3:30 – 4:45 PM |
| Office: | STEC 211N | Place: | STEC 279 |
| Email: | zcaos@tamusa.edu | CRN: | 11192 |

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:

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| Attendance | 10% |
| Homework #1 | 10% |
| Homework #2 | 10% |
| Homework #3 | 10% |
| Exam #1 | 20% |
| Exam #2 | 20% |
| Final Exam | 20% |

To ensure fairness, no additional assignments will be given on an individual basis. However, certain extra credit opportunities related to exams may be announced during the semester.

The final letter grades will be assigned as follows: 90% – 100% → *A*; 80% – 89% → *B*; 70% – 79% → *C*; 60% – 69% → *D*; Below 60% → *F*. Final letter grades are assigned strictly according to the published grading scale, and **no rounding** will be applied. 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:*

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| 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:*

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| Homework #1 Due | September 30th |
| Exam #1 | October 2nd |
| Homework #2 Due | November 4th |
| Exam #2 | November 6th |
| Homework #3 Due | December 4th |
| Final Exam | 2-3:30 PM, December 11th |

*Instructor may change this schedule during the semester.

- **Other Important Dates:**

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| First day of class | August 25 |
| Labor Day Holiday (No classes) | September 1 |
| Census Date | September 10 |
| Last day to drop with an automatic “W” | November 14 |
| Last day to withdraw from University | November 25 |
| Study Day (No classes) | November 26 |
| Thanksgiving Holiday (No classes) | November 27–29 |
| Last day of classes | December 4 |
| Study Day (No classes) | December 5 |
| Final Exams | December 6–12 |
| Commencement | December 16 |

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.

NOTE: Guidance on citing AI: <https://apastyle.apa.org/blog/how-to-cite-chatgpt>.

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 be considered when calculating 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.

Academic Accommodations for Persons with Disabilities: Texas A&M University–San Antonio is committed to providing all students with reasonable access to learning opportunities and accommodations in accordance with the Americans with Disabilities Act, as amended, and Section 504 of the Rehabilitation Act. If you experience barriers to your education due to a disability or think you may have a disability, Disability Support Services is located in the Central Academic Building, Suite 210. Phone: (210) 784-1335; Website: <https://www.tamusa.edu/Disability-Support-Services/index.html>; Email: dss@tamusa.edu. Disabilities may include, but are not limited to, attentional, learning, mental health, sensory, physical, or chronic health conditions. Students are encouraged to discuss disability-related needs with DSS as soon as possible.

Academic Learning Center: The Academic Learning Center provides free course-based tutoring to all currently enrolled students at Texas A&M University–San Antonio. Students wishing to work with a tutor can make appointments through the *Brainfuse* online tutoring platform. Brainfuse can be accessed in the *Tools* section of Blackboard. You can contact the Academic Learning Center by emailing tutoring@tamusa.edu, calling (210) 784-1307, or visiting the Central Academic Building, room 202.

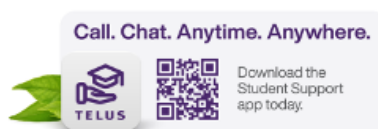
Counseling/Mental Health Resources: As a college student, there may be times when personal stressors interfere with your academic performance and negatively impact your daily functioning. If you are experiencing emotional difficulties or mental health concerns, support is available to you through the 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. For more information on SCC services visit <http://tamusa.edu/studentcounseling>.

Crisis support is available 24/7 by calling the SCC at (210) 784-1331.

Additionally, the TELUS Student Support App provides a variety of mental health resources including support for in-the-moment distress, an anonymous peer-to-peer support network, mental health screenings, podcasts, and articles to improve your mental wellbeing.

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: <https://www.tamusa.edu/about-us/emergency-management/>.

Download the SafeZone App (<https://safezoneapp.com/>) for emergencies or call (210) 784–1911. Non-Emergency (210) 784–1900.

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 by the published Census Date (the first week of class). Any student receiving federal financial aid who does not attend prior to the published Census Date (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.

Writing, Language, and Digital Composing Center: The Writing, Language, and Digital Composing Center supports graduate and undergraduate students in all three colleges as well as faculty and staff. Tutors work with students to develop reading skills, prepare oral presentations, and plan, draft, and revise their written assignments. Our language tutors support students enrolled in Spanish courses and students composing in Spanish for any assignment. Our digital studio tutors support students working on digital projects such as eportfolios, class presentations, or other digital multimedia projects. Students can schedule appointments through JagWire under the Student Services tab. Click on “Writing, Language, and Digital Composing Center” to make your appointment. The Center offers face-to-face, synchronous online, and asynchronous digital appointments. More information about what services we offer, how to make an appointment, and how to access your appointment can be found on our website at <https://www.tamusa.edu/academics>.

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 submit a CARE referral (<https://www.tamusa.edu/university-policies/Student-Rights-and-Responsibilities/file-a-report.html>) for support. Furthermore, please notify the professor if you are comfortable in doing so. This will enable them to direct you to available resources.

Military Affairs: Veterans and active-duty military personnel are welcomed and encouraged to visit the Office of Military Affairs for any question involving federal or state VA Education Benefits. Visit the Patriots’ Casa building, room 202, or to contact the Office of Military Affairs with any questions at military.va@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 this policy, students are provided with an opportunity to make

up any examination, study, or course 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 courses.

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.

Statement of Harassment and Discrimination: Texas A&M University–San Antonio is committed to the fundamental principles of academic freedom, equal 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 and the uniqueness of the individual on our campus and within our state, nation, and world. All decisions and actions involving students and employees are to 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, or pregnancy/parenting status. Individuals who believe they have experienced harassment or discrimination prohibited by this statement are encouraged to contact the University's Civil Rights Officer at 210-784-2061 or titleix@tamusa.edu.

Texas A&M University–San Antonio faculty are committed to providing 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 based on sex, know that help and support are available. A&M–San Antonio's Title IX Coordinator can support those impacted by such conduct 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 Title IX Coordinator. Please be aware that all A&M–San Antonio employees (other than those designated as confidential resources such as counselors and trained victim advocates) are required to report information about such discrimination and harassment to the university. This means that if you tell a faculty member about a situation of sexual harassment, sexual violence, or other related sex-based misconduct, the faculty member must share that information with the university's Title IX Coordinator (titleix@tamusa.edu, 210-784-2061, CAB 439K). If you wish to speak to a confidential employee who does not have this reporting requirement, you can contact the Student Counseling Center at (210) 784-1331 or visit them in Madla 120.

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 such reasonable modifications to pregnant students as would be provided to a student with temporary medical condition 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.

Young Jaguars: can support parenting students with daycare who meet this criteria: Must be enrolled in classes at TAMUSA in the current semester. Must be Pell eligible or a single parent. They serve children ages 3 to 12-years-old. Children must be enrolled in Pre-K-3 through 6th grade. youngjaguars@tamusa.edu (210) 784-2636.

Students' Rights and Responsibilities: The following statement of students' rights and responsibilities is intended to reflect the philosophical base upon which University Student Rules are built. This philosophy acknowledges the existence of both rights and responsibilities, which is inherent to an individual not only as a student at Texas A&M University-San Antonio but also as a citizen of this country.

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 administrative rule 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, and pregnancy/-parenting 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 students' 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 administration.
2. A student has the responsibility to be fully acquainted with the published University Student Rules found in the Student Handbook, Student Code of Conduct, on our website, and University Catalog, and to comply with them, as well as with federal, state, and local laws.
3. A student has the responsibility to recognize that student actions reflect upon the individuals involved and upon the entire University community.
4. A student has the responsibility to recognize the University's obligation to provide a safe environment for learning.
5. A student has the responsibility to check their university email for any updates or official university notifications.

We expect that students will behave in a manner that is dignified, respectful, and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation, or disability. Conduct that infringes on the rights of another individual will not be tolerated.

Students are expected to exhibit a high level of honesty and integrity in their pursuit of higher education. 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. For more information on academic misconduct policies and procedures please review the Student Code of Conduct (<https://www.tamusa.edu/university-policies/student-rights-and-responsibilities/documents/Student-Handbook-2022-23.pdf>) or visit the resources available in the OSRR website (<https://www.tamusa.edu/university-policies/student-rights-and-responsibilities/academic-integrity.html>).