

CSE310 Data Structures and Algorithms

Syllabus

Instructor

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Textbook

Introduction to Algorithms. 4th ed. by Cormen, Thomas, Charles Leiserson, Ronald Rivest, and Clifford Stein. MIT Press, 2021. ISBN-13: 978-0262046305

- Extra lecture handouts and sample codes will be provided through Canvas.
- A physical copy of the textbook is highly recommended! You will need this book for other courses or job interviews in future. The previous 3rd edition is okay with the course.

Catalogue Description

Advanced data structures and algorithms, including stacks, queues, trees, and graphs. Searching for graphs, hashing, sorting

Prerequisites

- For CS/CSE students, grades of at least C in CSE 220 or CSE 240 and at least C in MAT 243.
- For CMS students, grades of at least C in CSE 210 and at least C in MAT 243 or MAT 300.
- Programming experience in C++ or C is expected.

Course Objectives and Outcomes

Students who complete this course can:

- define data structures (types) such as heaps, balanced trees, hash tables.
- explain how to use a specific data structure in modeling a given problem.
- identify, construct, and clearly define a data structure that is useful for modeling a given problem.
- state some fundamental algorithms such as merge sort, topological sort, Prim's and Kruskal's algorithm, and algorithmic techniques such as dynamic programming and greedy algorithms.
- use a specific algorithmic technique in solving a given problem (e.g., I can write a dynamic program that solves a shortest path problem).
- design an algorithm to solve a given problem
- define the notions of worst case/best case/average case running times of algorithms.
- analyze and compare different asymptotic running times of algorithms.
- analyze a given algorithm and determine its asymptotic running time.

- combine fundamental data structures and algorithmic techniques in building a complete algorithmic solution to a given problem.
- create several algorithmic solutions to a given problem and choose the best one among them according to given requirements on time and space complexity.

Major Topics Covered in this Course

- Asymptotic Notation
- Worst-case Analysis
- Sorting, Lower Bound for Sorting, Heaps, and Heap sort
- Median, Selection Problems: More on Divide-and-Conquer Algorithms
- Hashing
- Binary Search Trees, Red Black Trees
- Disjoint Sets (union-find)
- Longest Common Subsequence: Introduction to Dynamic Programming
- Graph Algorithms (Depth-First Search, Breadth-First Search, Topological Sort, MST: Greedy Algorithms, Shortest Paths)

Exams, Quizzes and Assignments Policies

- **Exams:** There will be four exams, and their dates are fixed (see above). The lowest scored exam will be dropped.
- **Assignments:** This class is meant to be a programming intensive. This is accomplished through the programming assignments that are assigned every week or two. These are not small projects that can be started the night before they are due. You will need to spend some time designing it even before you do any coding.
- **Recitations:** CSE 310 students must also enroll in one recitation session. Recitations provide another opportunity for more exercises on the materials we learned in class.
- **Quizzes/Attendance:** Every week from time to time, just to enhance what you learned, I will give online quizzes and these quizzes are password protected.
- **Missed Assignments/Recitation:** if you need to miss an assignment/recitation, you must have a legitimate university approved excuse, such as a severe injury, illness or participation in a legal proceeding that require your presence, etc. You must contact the instructor and provide satisfactory evidence *prior or within two days after the absence*. A missed assignment/recitation without permission or supporting documents is a zero. For detailed information on this, please check the syllabus addendum.
- **Misce.:** Excused absences for classes will be given without penalty to the grade in the case of (1) a university-sanctioned event [[ACD 304-02](#)]; (2) religious holidays; (3) work performed in the line-of-duty according [[SSM 201-18](#)]. Students who request an excused absence must follow the policy/procedure guidelines stated inside the syllabus addendum. Excused absences do not relieve students of responsibility for any part of the course work required during the period of absence.

- **Grading Appeals:** Any questions, corrections, or appeals on grades of programs or tests must be done in writing within one week after it has returned to the class. State the problem and the rationale for any change in your grade in your appeal. For tests, bring the letter and test paper to the instructor. For assignments, contact the TA who graded it. Later in the semester I will not look at assignments/exams returned earlier in the semester.

Generative AI

All recitation, quizzes and assignments in this course must be individual work, i.e. you are required to compose your own unique solution to each problem and each project. The use of generative AI tools to complete any portion of the course assignment or project is prohibited and will be considered academic dishonesty and a violation of the ASU Academic Integrity Policy. Students confirmed to be engaging in non-allowable use of generative AI will be sanctioned according to the academic integrity policy and FSE sanctioning guidelines stated below.

Academic Integrity

- All engineering students are expected to adhere to the ASU Student [Honor Code](#) and the ASU academic integrity policy, which can be found at <https://provost.asu.edu/academic-integrity/policy>). Students are responsible for reviewing this policy and understanding each of the areas in which academic dishonesty can occur. If you have taken this course before, you may not reuse or submit any part of your previous assignments without the express written permission from the instructor.
- All student academic integrity violations are reported to the Fulton Schools of Engineering Academic Integrity Office (AIO). Withdrawing from this course will not absolve you of responsibility for an academic integrity violation and any sanctions that are applied. The AIO maintains a record of all violations and has access to academic integrity violations committed in all other ASU college/schools.
- For all written or programming assignments, recitations and quizzes, we will use powerful plagiarism detection software to compare and check all student's submission, violations will be reported to the Fulton Schools of Engineering Academic Integrity Office (AIO) immediately.

Student Copyright Responsibilities

You must refrain from uploading to this course shell, discussion board, website used by the course instructor or any other course forum, material that is not your own original work, unless you first comply with all applicable copyright laws. Course instructors reserve the right to delete materials from the course shell on the grounds of suspected copyright infringement.

The contents of this course, including lectures and other instructional materials, are copyrighted materials. Students may not share outside the class, including uploading, selling or distributing course content or notes taken during the conduct of the course. Any recording of class sessions

by students is prohibited, except as part of an accommodation approved by the Disability Resource Center. (see [ACD 304-06](#), “Commercial Note Taking Services” and ABOR Policy [5-308 F.14](#) for more information).

Miscellaneous

- **Withdraw:** if you wish to withdraw from the class, submitting a completed withdraw form to the registrar office is the only guaranteed way to officially withdraw from the class.
- **Incomplete grade:** I will NOT give “Incomplete” grade for this course. Please check the university policy on this at <http://www.asu.edu/aad/manuals/usi/usi203-09.html>. Please do not come to me during or at the end of the semester and ask for an "I" grade simply because you have fallen behind.
- **Classroom Behavior:** Students in this class are expected to acknowledge and embrace the FSE student professionalism expectation located at: <https://engineering.asu.edu/professionalism/>
Students, faculty, staff, and other individuals do not have an unqualified right of access to university grounds, property, or services (see [SSM 104-02](#)). Interfering with the peaceful conduct of university-related business or activities or remaining on campus grounds after a request to leave may be considered a crime. All incidents and allegations of violent or threatening conduct by an ASU student (whether on- or off-campus) will be reported to the ASU Police Department (ASU PD) and the Office of the Dean of Students.
- **Sexual Discrimination:** Arizona State University is committed to providing an environment free of discrimination, harassment, or retaliation for the entire university community, including all students, faculty members, staff employees, and guests. ASU expressly prohibits discrimination, harassment, and retaliation by employees, students, contractors, or agents of the university based on any protected status: race, color, religion, sex, national origin, age, disability, veteran status, sexual orientation, gender identity, and genetic information.

Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at <https://sexualviolenceprevention.asu.edu/faqs>.

As a mandated reporter, I am obligated to report any information I become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counseling Services, <https://eoss.asu.edu/counseling> is available if you wish

to discuss any concerns confidentially and privately. ASU online students may access 360 Life Services, <https://goto.asuonline.asu.edu/success/online-resources.html>.

- **DRC Service:** Suitable accommodation is made for students having disabilities. Students needing accommodation must register with the ASU Student Accessibility and Inclusive Learning Services office and provide documentation of that registration to the instructor. Students should communicate the need for accommodation in enough time for it to be properly arranged. See [ACD 304-08](#) Classroom and Testing Accommodations for Students with Disabilities.
- **Photo requirement:** Arizona State University requires each enrolled student and university employee to have on file with ASU a current photo that meets ASU's requirements (your "Photo"). ASU uses your Photo to identify you, as necessary, to provide you educational and related services as an enrolled student at ASU. If you do not have an acceptable Photo on file with ASU, or if you do not consent to the use of your photo, access to ASU resources, including access to course material or grades (online or in person) may be negatively affected, withheld or denied.

The instructor reserves the right to revise this syllabus as necessary.