

CS 2401 Elementary Data Structures and Algorithms

Fall 2020 Syllabus

Prerequisite

CS 1301 and CS 1101 with a grade of C or better in both.

Course Objectives

This is the second course for students majoring in Computer Science. Students will learn about fundamental computing algorithms including searching and sorting; recursion; elementary abstract data types including linked lists, stacks, queues and trees; and elementary algorithm analysis.

Knowledge and Abilities Required Before Entering the Course

Students are assumed to be comfortable programming in Java. Students should be able to code basic arithmetic expressions, define simple classes, use strings, code loops and conditional statements, write methods, create objects from classes, invoke methods on an object, perform basic text file input and output, and use arrays.

Topics

1. Review and deeper study of arrays, objects, linked lists, and recursion.
2. Introduction to algorithm analysis and rigorous study of searching and sorting algorithms.
3. New data structures: binary trees (including binary search trees), stacks, and queues, along with their implementations.

Course information

Class Lecture information:

CRN: 18737

Class time: Mondays and Wednesdays 12:00pm-1:20pm

Class location: Blackboard Collaborate Ultra (available in the Blackboard entry for the CS 2401 lecture.)

Lab information:

CRN: 15766

Lab sessions: Tuesdays and Thursdays 9:00am-10:20am

Class location: Blackboard Collaborate Ultra (available in the Blackboard entry for the CS 2401 Lab.)

Instructor information:

Instructor: Dr. Mahmud Shahriar Hossain

Email: mhossain@utep.edu

Office hours: Mondays Wednesdays 2:00 PM – 3:00 PM
and by appointment.

Office location: MS Teams ([Link to the MS Teams office room](#))

Teaching Assistant (TA):**Teaching Assistant:** Eduardo Lara**Email:** ealara3@miners.utep.edu**Office hours:** Mondays Wednesdays Fridays : 10:00 am - 12:00 pm**Office location:** Blackboard Collaborate Ultra in the Blackboard entry for the CS 2401 Lab.**Instructional Assistants (IAs):****Instructional Assistant:** Raquel Gonzalez**Email:** rbgonzalez3@miners.utep.edu**Office hours:** Tuesdays and Thursdays 1:30 pm to 3:30 pm**Office location:** Blackboard Collaborate Ultra in the Blackboard entry for the CS 2401 Lab.**Instructional Assistant:** Efrain Retana**Email:** eretana1@miners.utep.edu**Office hours:** Tuesday 11am-12pm

Wednesday- 3pm-4:30pm

Friday 12:30pm-2:00pm

Office location: Blackboard Collaborate Ultra in the Blackboard entry for the CS 2401 Lab.**Peer Leader (PL):****Peer Leader:** Alexis Rodriguez**Email:** arodriguez248@miners.utep.edu**Office hours:** Fridays from 2:00 pm to 4:00**Office location:** Blackboard Collaborate Ultra in the Blackboard entry for the CS 2401 Lab.

NOTE: The next computer science class CS 2302 (Data Structures) has two prerequisites: CS2401 and MATH 2300 (Discrete Math). To avoid delaying your progress through the program, if you are not currently taking MATH 2300 and have not already passed it, you should seriously consider registering for MATH 2300.

Logistics

While each week of the course will be slightly different, and students should stay up to date, an “average” week in the course will include:

- 2 synchronous class sessions where the instructor will lead a discussion of examples and answer questions about the materials being learned
- 2 synchronous lab sessions where the TAs/IAs/PLs will lead a discussion primarily related to the lab assignments
- 2-3 zyBooks homework assignments
- 1-2 in-class/homework activities
- 1 laboratory implementation assignment

- 1 group activity (lead by the peer leading staff)

Note: The instructor may make changes to this syllabus during the semester to serve students better.

Textbook

CS2401: Elementary Data Struct./Algorithms, by zyBooks (cost: \$77)

1. Sign in or create an account at <https://learn.zybooks.com/>
2. Enter zyBook code: UTEPCS2401Fall2020
3. Subscribe (choose section: CS2401-Hossain)

Expectations

Communication: Students are expected to consult their emails and blackboard messages at least thrice a week, and to answer these as relevant.

Class and Lab Participation: Keeping up with asynchronous content and participation in all synchronous class and lab sessions are critical factors of your success in this course.

Students should be on time for all scheduled sessions and attend the entire session.

Attendance will be taken at every class and lab, and will count towards your class participation grade.

Students should be on task: When in synchronous class or lab session, students are expected to direct their attention to the task / activity as directed by the lecture / lab instructor. For instance, synchronous class sessions are certainly not places for social-networking and working on homework.

Professionalism: Students should notify the instructor prior to missing a session if at all possible, and certainly right after if earlier was not possible. The instructor will allow two unexcused absences per semester before having the option to deduct points from the final grade. Students should submit their work on time and meet all deadlines. Failing to do so will affect the participation grade.

It is the student's responsibility to review the content covered during missed class(es) or labs, as well as the assignments given during their absence. Participation points also include completing post-lecture and post-labs activities (when requested) that are administered as surveys to monitor students' overall progress and potential struggles.

Grading

Grades are communicated to students in a timely manner. It is the students' responsibility to keep track of their grades by compiling the grades they receive. Your semester grade will be based on a combination of homework assignments, weekly quizzes, class participation, mid-term exams, student engagement, pre-final, and a final exam.

The approximate percentages are as follows:

- 3% Class participation
- 15% Homework/Quizzes/In-class assignments grade
- 35% Lab grade
- 12% Mid-term exams (4 small exams, around an hour each)
- 10% Final-prep exam (around 2 hours)
- 25% Final exam (Equal or less than 2 hours 45 minutes)

The nominal percentage-score-to-letter-grade conversion is as follows:

- 90% or higher is an A
- 80-89% is a B
- 70-79% is a C
- 60-69% is a D
- below 60% is an F

These minimums may be lowered without notice but will not be raised.

Regardless of your standing in the class at that time, you need to earn a C or better at the final exam to pass the course as well as a C or better as your average grade on the lab assignments.

Homework / Quizzes / In-class assignments

Quizzes: The purpose of each quiz is to ensure that students are staying current with the weekly reading assignments and to verify that they have acquired the skills developed in class.

Most quizzes are unannounced. All quizzes will be on blackboard, and there will be no make-up on missed quizzes.

In-class assignments: There will be unannounced in-class assignments, to be turned in either by the end of the class or within a short period of time after the class (details will be given for each assignment).

There will be no make-up for missed in-class assignments/activities.

Online Homework: You should expect to spend at least four hours per week outside of lecture on reading and homework. You should plan to devote extra four hours on your lab assignments.

Most of your homework will be work assigned on your online zyBooks:

all deadlines are available in advance on your zyBooks so that you can plan ahead.

Completing the assigned activities on time will be crucial to your success in the class (since these activities prepare you for classwork and exams).

Reading and homework assignments to be completed on your online textbook are usually meant to familiarize you with concepts that will be covered in depth in class.

If you struggle in any way while working on these, it is crucial that you seek help as soon as possible.

If you miss a synchronous class session, it is your responsibility to find out what you missed, including assignments that might have been given in class.

Online homework grade: At each deadline, your instructor will collect your progress towards the due assignment.

The % of completion you have achieved will be used to compute your grade on this particular homework.

Lab assignments and related homework

Lab assignments are designed for you to further your practice on the concepts presented in class and demonstrate your level of mastery of these. In lab, you will typically work on either small activities related to currently covered concepts or concepts in which your instructional team thinks you should acquire more fluency, or more substantial lab assignments.

Specifically, there will be approximately one lab assignment per week and a few smaller lab activities.

Other activities: In lab, once a week on most weeks, you will participate in group-work during which you will solve problems. You are expected to take an active part in these activities.

Attendance and active participation: You are expected to attend and actively participate in labs (active participation includes the group activities).

Attendance will be taken and will count towards your overall standing in the class.

Grade: Your grade for labs will be a combination of the grades you obtain at your lab assignments (92%), your participation and performance on smaller activities, as well as your active participation in the problem-solving group activities (5%), and finally, your homework completion (3%).

This grade will weigh 35% of your overall CS2401 grade.

You need to score 70% or higher in labs to pass CS2401, regardless of your average otherwise.

Exams

There will be **four** small exams through the semester, **one** final-prep exam, and **one** final exam. Because the exams contribute heavily to your total grade, it is vital that you do well on them. The purpose of the midterm exams is to allow you to demonstrate mastery of course concepts covered thus far during the semester.

Mid-term exams will take place on backboard with clear time constraints and are tentatively scheduled to be held on week 3, week 6, week 9, and week 12.

The average of the 4 midterm grades is worth 12\% of your overall grade for CS2401.

The final and final-prep exams will be comprehensive.

You must score 70% or better on the final exam to pass this course.

Final exam date and time will be communicated during the semester.

The final-prep exam is worth 10% of your overall grade. The final exam is worth 25% of your overall grade.

Standing in the course

Students will have access to their grades for all assignments so that they can self-monitor their standing and progress. However, it is also completely fine for any student to come and talk to their instructor about their standing and work together to make sure the student is as successful as can be.

Dropping the Course

Every semester, some students drop the course. We, instructors, completely understand and respect that. We only hereby ask students to inform us, ideally before, but in the worst-case right after, of their intention to drop the course. This is really important for us as it possibly informs us of ways in which to better serve our students.

Special notices for COVID-19

While there is not a plan to hold any meetings of 2401 on campus this semester, as the university updates it's campus operations there may be situations that lead a student to be on campus. The following are a summary of the universities policies regarding COVID-19.

You must **STAY OFF CAMPUS** and **REPORT** if you:

- (1) have been diagnosed with COVID- 19,
- (2) are experiencing COVID-19 symptoms, or
- (3) have had recent contact with a person who has received a positive coronavirus test.

Reports should be made at screening.utep.edu.

If you know anyone who should report any of these three criteria, encourage them to report. If the individual cannot report, you can report on their behalf by sending an email to COVIDaction@utep.edu.

For each day that you attend campus—for any reason—you must complete the questions on the UTEP screening website (screening.utep.edu) prior to arriving on campus. The website will verify if you are permitted to come to campus.

Under no circumstances should anyone come to class when feeling ill or exhibiting any of the known COVID-19 symptoms.

If you are feeling unwell, please let me know as soon as possible, and alternative instruction will be provided. Students are advised to minimize the number of encounters with others to avoid infection.

Wear face coverings when in common areas of campus or when others are present.

You must wear a face covering over your nose and mouth at all times in this class.

If you choose not to wear a face covering, you may not enter the classroom.

If you remove your face covering, you will be asked to put it on or leave the classroom.

Students who refuse to wear a face covering and follow preventive COVID-19 guidelines will be dismissed from the class and will be subject to disciplinary action according to Section 1.2.3 Health and Safety and Section 1.2.2.5 Disruptions in the UTEP Handbook of Operating Procedures.

Resources

Special Accommodations: If you have a disability and need classroom accommodations, please contact the Center for Accommodations and Support Services (CASS) at 747-5148 or by email to cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at www.sa.utep.edu/cass. CASS' staffs are the only individuals who can validate and if need be, authorize accommodations for students with disabilities.

Scholastic Dishonesty: Any student who commits an act of scholastic dishonesty is subject to discipline. Scholastic dishonesty includes, but not limited to cheating, plagiarism, collusion, and submission for credit of any work or materials that are attributable to another person.

Cheating is:

- Copying from the test paper of another student
- Communicating with another student during a test to be taken individually

- Giving or seeking aid from another student during a test to be taken individually
- Possession and/or use of unauthorized materials during tests (i.e. crib notes, class notes, books, etc.)
- Substituting for another person to take a test
- Falsifying research data, reports, academic work offered for credit

Plagiarism is:

- Using someone's work in your assignments without the proper citations
- Submitting the same paper or assignment from a different course, without direct permission of instructors

To avoid plagiarism, see: [Avoiding-Plagiarism.pdf](#)

Collusion is: Unauthorized collaboration with another person in preparing academic assignments

When in doubt on any of the above, please contact your instructor to check if you are following authorized procedure. Also, please check the UTEP's Handbook of Operating Procedures at: hoop.utep.edu.

Learning Outcomes

Level 1: Knowledge and Comprehension

Level 1 outcomes are those in which the student has been exposed to the terms and concepts at a basic level and can supply basic definitions. On successful completion of this course, students will be able to:

1. Explain the concept of polymorphism

Level 2: Application and Analysis:

Level 2 outcomes are those in which the student can apply the material in familiar situations, e.g., can work a problem of familiar structure with minor changes in the details. Upon successful completion of this course, students will be able to:

1. Describe, implement, and use the following concepts:
 - a. classes, subclasses, and inheritance
 - b. encapsulation and information hiding
2. Describe, implement, and use the following algorithms:
 - a. sequential and binary search
 - b. quadratic and $O(n \log n)$ sorting
 - c. string manipulation and parsing
3. Describe and trace computer representation and memory allocation of:
 - a. integers, real numbers, arrays and objects
 - b. methods, including recursive methods and the use of activation records
4. Use basic notions of algorithm complexity:

- a. use Big-O notation to express the best-, average- and worst-case behaviors of an algorithm
 - b. determine the best, average and worst-case behaviors of a simple algorithm
 - c. assess basic time and space trade-offs in algorithms
5. Use recursion and iteration as problem solving techniques

Level 3: Synthesis and Evaluation:

Level 3 outcomes are those in which the student can apply the material in new situations. This is the highest level of mastery. On successful completion of this course, students will be able to identify, implement and use the following data structures as appropriate for a given problem:

1. Design and implement solutions to computational problems using the following data structures:
 - a. multi-dimensional arrays;
 - b. lists implemented as arrays or linked lists;
 - c. stacks;
 - d. queues;
 - e. binary trees and binary search trees.