Course Objectives: Upon successful completion of the course, you will be able to compare and select algorithms according to their algorithmic complexity. You will apply the fundamental techniques of counting. You will identify and model problems with graphs and trees. You will reinforce your familiarity with induction and recursion and their relevance to computer science. Also, you will have a general understanding of why knowing how to model problems using graphs and trees is crucial in many computer science areas.

You will become active learners, and develop an understanding of the essential connections/relevance of the content of this course with different fields of Computer Science.

Prerequisite: Students must have passed both of the following with a C or better:

- MATH 1411
- CS 2101

Knowledge and Abilities Required Before Entering the Course: Students are assumed to be comfortable with basic algebra, and have some exposure to programatic thinking and problem solving.

Topics covered this semester:

- algorithmic complexity and program analysis
- counting methods and how their implications in computer science
- graphs and trees as mathematical concepts
- reinforcing proof methods from discrete structures 1
1 Logistics

Synchronous course session times and locations:
- MW 7:30a - 8:50a — BUSN 323


This course, in combination with Discrete Structures 1, will cover the majority of this entire text. Within Discrete Structures 2 we will cover the contents of Chapters 6–9 and 10. Because previous instances of this course used a different book, we may at points go back to previous chapters in the book for a refresher on terminology.

Communication platforms:
- Blackboard – Used for announcements and grade tracking. All official grades and feedback will be sent through Blackboard. Students should monitor this site for important class information.
- MS Teams – Used for office hours and intra-class discussions. Several channels will be available in the team for asking and answering questions, the instructional
staff will answer questions posted on teams, but other students are encouraged to provide feedback as well.

2 Instructional Staff

Instructors

Dr. Marcelo Frias
email: mfrias4@utep.edu
MS Teams: mfrias4@utep.edu (direct message)
office: CCSB 3.1008
office hours: M,T,W,R 9:00a - 10:00a
Feel free to drop by my office at any time.
If I am available, I will receive you immediately.
If I am busy, we can set an appointment.
Or send me email to set an appointment.

Teaching Assistants

Niaz Morshed
email: amorshed@utep.edu
office hours: M W 04:30p - 05:30p
. T 02:00p - 04:00p (online via Teams)
where: CCSB 1.0706

Instructional Assistants

Gabriel Miki-Silva
email: gmikisilva@miners.utep.edu
office hours: T R 04:00p - 06:00p
where: CCSB G.0512

Adalberto Vazquez Villalobos
email: avazquezvi@utep.edu
office hours: M W 12:00p - 14:00p
where: CCSB G.0512

3 Expectations

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

Class Participation: Keeping up with class contents and participation in lectures will greatly help in your success in this course.

Students should be on time for all scheduled sessions and attend the entire session. This semester attendance will not be taken as class participation, but we will keep track of
assistance for statistical purposes. Yet students who attend and participate in classes, usually do good in assessments.

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 online quizzes (when requested) that are administered as surveys to monitor students’ overall progress and potential struggles.

*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, working on homework, participating in other courses.

*Professionalism:* Students should be professional in their communications, as the context permits. Emails should contain subjects, the recipients should be addressed (i.e. “Hello Marcelo, ..”), and the email should be signed with your name. Real-time online communication (i.e. MS Teams), while less formal, should still be professional.

## 4 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 assessment, and a final exam.

The approximate percentages are as follows:

- **15%**  Class participation
- **20%**  Homework/Quizzes/In-class assignments grade
- **40%**  Mid-term assessment
- **25%**  Final exam

The base percentage-score-to-letter-grade conversion for this course is as follows:

- **90%**  or higher is guaranteed an A
- **80%**  or higher is guaranteed a B
- **70%**  or higher is guaranteed a C
- **60%**  or higher is guaranteed a D
  all lower grades are an F

These minimums may be lowered without notice but will not be raised.
4.1 Homework / Quizzes / In-class assignments

4.1.1 Quizzes

The purpose of each quiz is to ensure that students are staying current with the weekly content and to verify that they have acquired the skills developed in class. Short quizzes are unannounced. All quizzes will be in person, Quizzes are graded on submission not on correctness as a way to judge the progress of the student body, please try your best but note when you’re making an educated guess.

There will be no make-up on missed quizzes, but up to 3 quizzes can be dropped (missed) though the course of the semester.

4.1.2 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. Grades of such assignments will weigh equally with grades from quizzes.

4.2 Exams & Assessments

If you have test-taking difficulties in general, or if you have difficulties with our tests in particular, please request appropriate accommodation from UTEP’s Center for Accommodation and Students’ Services.

The purpose of the midterm assessment is to allow you to demonstrate mastery of course concepts covered thus far during the semester. Mid-term assessments will take place in class and are tentatively scheduled to be held in weeks 7 and 14. A makeup exam will be given in week 15. If you must miss an exam, please meet with an instructor, BEFORE the exam.

Students are required to be on time for assessments. If a student is late, no extra time will be given.

The final exam will be comprehensive. This is University policy. If you have a scheduling conflict (e.g., if you are taking a final at EPCC) or if you are scheduled for three final exams in one day, see your instructor at least a week in advance for arranging accommodation.

<table>
<thead>
<tr>
<th>Final Exam Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRN 14423 Wednesday, December 13th, 2023; 7:00 am–9:45 am (the time may change, not the date).</td>
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</tbody>
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x
5 Standing in the course

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.

6 Special notices for COVID-19

Please stay home if you have been diagnosed with COVID-19 or are experiencing COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible, so that we can work on appropriate accommodations. If you have tested positive for COVID-19, you are encouraged to report your results to covidaction@utep.edu, so that the Dean of Students Office can provide you with support and help with communication with your professors. The Student Health Center is equipped to provide COVID-19 testing.

The Center for Disease Control and Prevention recommends that people in areas of substantial or high COVID-19 transmission wear face masks when indoors in groups of people. The best way that Miners can take care of Miners is to get the vaccine. If you still need the vaccine, it is widely available in the El Paso area, and will be available at no charge on campus during the first week of classes. For more information about the current rates, testing, and vaccinations, please visit epstrong.org.

Masks in the classroom

The instructional staff will be following CDC guidance on masking in groups based on the current transmission rates in El Paso County\(^a\). Please respect the choices of other who may prefer to be more cautious than recommendations.


7 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’ staff 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: https://www.utep.edu/student-affairs/osccr/_Files/docs/Avoiding-Plagiarism.pdf

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

**Important!**

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.

### 8 Detailed Learning Outcomes

**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. Reason about the complexity of algorithms using counting techniques and properties of graphs
2. Model computer science problems using graphs and trees
3. Lay out a proof plan for existential and universal proofs, be able to identify shortcomings of some types of proving strategies
4. Identify an inductive structure of a set: use it to conduct an inductive proof and to set a recurrence relation.

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. Articulate what counting is and how relevant it is to computer science.
2. Apply the basic principles of counting.
3. Model combinatorial problems using graphs and trees.
4. Describe various types of graphs and their common properties.
5. Identify trees as a fundamental structure in modeling computer science problems.

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. Multiple types of graphs and trees, and how they each are relevant to computer science.