

# Discrete Structures 1

Dr. Dan DeBlasio  
Department of Computer Science  
University of Texas at El Paso

CS 2101 – Spring 2023

Revised: January 9, 2023  
(change since start of classes marked in orange)

**Course Objectives:** Upon successful completion of the course, you will have a solid understanding of the following topics: propositional logic, proofs, sets, functions, and relations, counting, induction and recursion. Most importantly, you will know of and be able to articulate how these topics are essential in Computer Science.

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

- MATH 1310
- MATH 1312
- MATH 1411
- MATH 1508
- MATH 2301
- MATH 2313
- MATH 2326

or have taken equivalent tests as described in the [UTEP course catalog](#).

**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:**

- connections between mathematics concepts and computer science
- proof, logic, and induction mechanisms and how they can be implemented and applied
- logic and reasoning as it applies to computer science problem solving

# Contents

<b>1 Logistics</b>	<b>2</b>
<b>2 Instructional Staff</b>	<b>3</b>
<b>3 Expectations</b>	<b>3</b>
<b>4 Grading</b>	<b>4</b>
4.1 Homework / Quizzes / In-class assignments . . . . .	4
4.2 Exams & Assessments . . . . .	5
<b>5 Detailed Learning Outcomes</b>	<b>6</b>

## 1 Logistics

### Synchronous course session times and locations:

- CRN 24876: TR 8:00am-8:50a — LART 106
- CRN 25983: TR 12:00pm-12:50p — GEOL 123

Because of space constraints, you cannot come to another section's lecture!

**Textbook:** *Connecting Discrete Mathematics and Computer Science*, 2nd edition by David Liben-Nowell from Cambridge University Press. Available at the bookstore and other booksellers (ISBN: 978-1-00-915049-1). A preprint (with some corrections missing) of the textbook is available online at <https://cs.carleton.edu/faculty/dln/book/> if you have ordered the book but are waiting for it to arrive.

This course, in combination with Discrete Structures 2, will cover the majority of this entire text. Within Discrete Structures 1 we will cover the contents of Chapters 2–5 and some of chapter 6.

### 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. Dan DeBlasio**

email: [dfdeblasio@utep.edu](mailto:dfdeblasio@utep.edu)  
MS Teams: [teamsChat.deblasiolab.org](https://teamsChat.deblasiolab.org) (direct message)  
office: CCSB 3.1008  
office hours: T & R 10:30a-11:30a  
appointments: [calendly.deblasiolab.org](https://calendly.deblasiolab.org)

### Teaching Assistants

**Ivan Montoya Sanchez**

email: [iamontoyasa@miners.utep.edu](mailto:iamontoyasa@miners.utep.edu)  
office hours: TBD

### Instructional Assistants

**Felix Millan**

email: [frmillan@miners.utep.edu](mailto:frmillan@miners.utep.edu)  
office hours: TBD

## 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 and Lab Participation:** Keeping up with class contents and participation in both lecture 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.* This semester attendance will not be taken to discourage those who may be sick to stay home, but those students who attend and readily participate in the course do better on assessments.

Students should notify the instructor prior to missing a session if at all possible, and certainly right after if earlier was not possible. 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 Dr. DeBlasio, ...”), 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, 4 mid-term assessments, student engagement, and a pair of comprehensive exams.

The approximate percentages are as follows:

<b>20%</b>	Class participation
<b>35%</b>	Homework/Quizzes/In-class assignments grade
<b>25%</b>	Mid-term assessment
<b>20%</b>	Final exam

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

<b>90%</b>	or higher is guaranteed an A
<b>80%</b>	or higher is guaranteed a B
<b>70%</b>	or higher is guaranteed a C
<b>60%</b>	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 Daily 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 Long Quizzes

Though the course of the semester we will have longer (graded) quizzes. The modality of the quizzes will either be in class or online (to be determined). They will be scheduled directly proceeding (the meeting before) each mid-term assessment and will cover similar material. Details on these long quizzes will be announced in class as they occur.

### 4.1.3 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 is tentatively scheduled to be held in week 8. Make-up exams will be given only in extremely unusual circumstances. If you must miss an exam, please meet with an instructor, *BEFORE* the exam.

Students are required to be on time for assessments, a 10% reduction to an assessment grade will be made if a student arrives more than 5 minutes after the start of the test, and 20% at 10 minutes,. A 100% deduction will be made after 15 minutes. Arriving to a test late is disruptive to all students in the class and cannot be tolerated.

**The final exam will be comprehensive.** You must take the final exam during the time shown in the schedule for the lecture section that you normally attend. Do not "drop in" to another section: there will not be a copy of the exam for you. 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.

#### Final Exam Date

**CRN 24876: Thursday, May 11th, 2023; 7:00 am–9:45 am.**

**CRN 25983: Tuesday, May 9th, 2023; 1:00 pm–3:45 pm.**

## 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](mailto: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](http://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<sup>a</sup>. Please respect the choices of other who may prefer to be more cautious than recommendations.

<sup>a</sup><https://www.cdc.gov/coronavirus/2019-ncov/your-health/covid-by-county.html>

## 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](mailto: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](http://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](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](http://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. **Proofs:** mechanics of proofs
2. **Propositional logic:** propositions and operators, representation of knowledge in propositional logic, evaluation of propositions, relation to conditional statements, logical equivalence
3. **Induction:** ability to lay out a proof by induction

## 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. **Basic logical reasoning for propositional logic**
2. **Sets, functions, relations, and their relation to logic**

## 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. **Counting and its relevance to computer science**
2. **Predicate logic:** understanding what it is, being able to represent knowledge in predicate logic, and write in English predicate logic expressions
3. **Recurrence relations**