

Course Syllabus

CS 2305: **Discrete Mathematics for Computing I**, Fall 2024. (Same as CE 2305.)

Professor Contact Information

Name: Benjamin Raichel

Phone: (972) 883-4193

E-mail: benjamin.raichel@utdallas.edu

Office: ECSS 4.226

Office hours time: TBD

Office hours will be held online through MS Teams.

Course Pre-requisites, Co-requisites, and/or Other Restrictions

Prerequisites: ALEKS score required or ([MATH 2413](#) or [MATH 2417](#)) with a grade of C or better.

Course Description

Discrete Mathematics for Computing I (3 semester credit hours) Principles of counting. Boolean operations. Logic and proof methods. Recurrence relations. Sets, relations, functions. Elementary graph theory. Elementary number theory.

Course Learning Outcomes

1. Ability to use and apply basic definitions and properties of logic
 2. Ability to recognize and construct valid proofs including proofs by induction
 3. Ability to understand what an algorithm is, use algorithms, use Big-O notation and algorithmic complexity
 4. Ability to use basic counting techniques
 5. Ability to use and apply basic definitions and properties of sets, relations, functions
 6. Ability to understand and apply elementary number theory
 7. Ability to understand and apply graph theory
-

Course Content

All content for this course (lecture videos, assignments, exams, etc.) are for registered students of this course only. Do not share or publicly post any of these materials.

Course Mode

The course mode is face-to-face. Lectures will be in our assigned classroom on campus. Exams will be taken in the testing center. Homeworks and smartbooks are online.

Grading Policy

- Homeworks 25%: There will be roughly one homework assignment for each chapter of the book we cover (roughly every 1 to 2 weeks), consisting of a mix of multiple choice and written answer problems.
- Smartbooks 15%: Smartbook assignments are taken online through the McGraw Hill Connect platform. They will be assigned each week and are graded based on the percentage you complete.
- Exams 60%: There will be a midterm and a final, each worth 30%. Each exam will be 90 minutes long and will be taken at the UTD testing center. The Midterm will be open for sign up from Monday September 9/30 to Saturday 10/05. The final will be open for sign up from Saturday 12/07 to Monday 12/13.

Your lowest homework score and your lowest Smartbook score will automatically be dropped.

The following cutoffs will be used when determining your course grade:

- $95 \leq A+ \leq 100$
 - $85 \leq A < 95$
 - $80 \leq A- < 85$
 - $75 \leq B+ < 80$
 - $65 \leq B < 75$
 - $60 \leq B- < 65$
 - $55 \leq C+ < 60$
 - $45 \leq C < 55$
 - $40 \leq C- < 45$
 - $35 \leq D+ < 40$
 - $25 \leq D < 35$
 - $20 \leq D- < 25$
 - $F < 20$
-

Testing Center Information

Exams will be at the UTD testing center. Sign up and guidelines:
<https://ets.utdallas.edu/testing-center/students>

Please carefully read all the guidelines for the testing center. You are strongly encouraged to register for your exam time slot at the beginning of the semester. Depending on availability, you can change your time slot later.

Those who do not register at least 48 hours in advance will not be able to take the exam.

The midterm will be open for signup from 9/30 to 10/05. The goal is to have the midterm review on 9/25, however, the schedule is tight, so it may occur on 9/30. *Thus, it is recommended that when selecting a midterm time slot, you pick one that is after class time on 9/30.* Also, when scheduling your exam keep in mind that we may cover new material in class on one or both of 9/30 and 10/02, however, this new material will not be on the midterm.

For exams you can bring a “cheat sheet”, which is a single sheet of paper of size no more than 8.5x11 inches (i.e. standard size). You can only write on one side of the sheet. You can type or handwrite this sheet. You are not allowed any other materials at the exams.

Course & Instructor Policies

--No late homeworks will be accepted, unless the student provides a valid documented reason, i.e. medical or family emergencies. I intend to enforce this strict late homework policy, which is partly the reason for allowing the lowest homework score to be dropped.

--If a student is unable to take the examinations on their scheduled dates, they should inform the instructor well in advance. Makeup examinations will be scheduled only if the student has a valid medical excuse.

--Any request for a regrade needs to be made within one week of the assignment or exam being returned. Note that a regrade request means “regrade”, i.e. your score could go down. Homework regrade requests should be made directly to the Grader/TA.

--Students are required to solve problems without the help of outside sources (i.e. “googling the solution”).

Textbook and Course Content

The required textbook for this course is “Discrete Mathematics and its Applications” by Kenneth Rosen, eighth edition. Below is a list of sections to be covered.

Chapter 1: The Foundations

1.1 Propositional Logic

1.3 Propositional Equivalences

1.4 Predicates and Quantifiers

1.5 Nested Quantifiers

1.6 Rules of Inference

1.7 Introduction to Proofs

1.8 Proof Methods and Strategy

Chapter 2: Basic Structures

2.1 Sets

2.2 Set Operations

2.3 Functions

2.4 Sequences and Summations

2.5 Cardinality of Sets

2.6 Matrices

Chapter 3: Algorithms

3.1 Algorithms

3.2 The Growth of Functions

3.3 Complexity of Algorithms

Chapter 4: Number Theory

4.1 Divisibility and Modular Arithmetic

4.2 Integer Representations and Algorithms

4.3 Primes and Greatest Common Divisors

4.4 Solving Congruences

Chapter 5: Induction and Recursion

5.1 Mathematical Induction

5.2 Strong Induction and Well-Ordering

5.3 Recursive Definitions and Structural Induction

5.4 Recursive Algorithms

Chapter 6: Counting

6.1 The Basics of Counting

6.2 The Pigeonhole Principle

6.3 Permutations and Combinations

6.4 Binomial Coefficients and Identities

6.5 Generalized Permutations and Combinations

Chapter 8: Advanced Counting Techniques

8.1 Applications of Recurrence Relations

8.2 Solving Linear Recurrence Relations

8.3 Divide and Conquer Algorithms and Recurrence Relations

8.5 Inclusion-Exclusion

8.6 Applications of Inclusion-Exclusion

Chapter 9: Relations

9.1 Relations and Their Properties

9.3 Representing Relations

9.5 Equivalence Relations

9.6 Partial Orderings

Chapter 10: Graphs

10.1 Graphs and Graph Models

10.2 Graph Terminology and Special Types of Graphs

10.3 Representing Graphs and Graph Isomorphism

10.4 Connectivity

10.5 Euler and Hamilton Paths

Chapter 11: Trees

11.1 Introduction to Trees

11.3 Tree Traversal

11.4 Spanning Trees

Class Materials

The instructor may provide class materials that will be made available to all students registered for this class as they are intended to supplement the classroom experience. These materials may be downloaded during the course, however, these materials are for registered students' use only. Classroom materials may not be reproduced or shared with those not in class, or uploaded to other online environments except to implement an approved Office of Student AccessAbility accommodation. Failure to comply with these University requirements is a violation of the [Student Code of Conduct](#).

Class Attendance

The University's attendance policy requirement is that individual faculty set their course attendance requirements. Regular and punctual class attendance is expected. Students who fail to attend class regularly are inviting scholastic difficulty. In some courses, instructors may have special attendance requirements; these should be made known to students during the first week of classes.

Class Participation

Regular class participation is expected. Students who fail to participate in class regularly are inviting scholastic difficulty. A portion of the grade for this course is directly tied to your participation in this class. It also includes engaging in group or other activities during class that solicit your feedback on homework assignments, readings, or materials covered in the lectures (and/or labs). Class participation is documented by faculty. Successful participation is defined as consistently adhering to University requirements, as presented in this syllabus. Failure to comply with these University requirements is a violation of the [Student Code of Conduct](#).

Class Recordings

Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures. Unless the Office of Student AccessAbility has approved the student to record the instruction, students are expressly prohibited from recording any part of this course. Recordings may not be published, reproduced, or shared with those not in the class, or uploaded to other online environments except to implement an approved Office of Student AccessAbility accommodation. Failure to comply with these University requirements is a violation of the [Student Code of Conduct](#).

The instructor may record meetings of this course. These recordings will be made available to all students registered for this class if the intent is to supplement the classroom experience. If the instructor or a UTD school/department/office plans any other uses for the recordings, consent of the students identifiable in the recordings is required prior to such use unless an exception is allowed by law.

Comet Creed

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:

“As a Comet, I pledge honesty, integrity, and service in all that I do.”

Academic Support Resources

The information contained in the following link lists the University’s academic support resources for all students.

Please see <http://go.utdallas.edu/academic-support-resources>.

UT Dallas Syllabus Policies and Procedures

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus. Please review the catalog sections regarding the [credit/no credit](#) or [pass/fail](#) grading option and withdrawal from class.

Please go to <http://go.utdallas.edu/syllabus-policies> for these policies.

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.