



0701M240

Introduction to Discrete Mathematics

Instructor: TBA

E-mail: TBA

Time: May 17, 2027 - June 18, 2027

Office Hours: by appointment

Contact Hours: 60 (50 minutes each)

Credits: 4

Course Description

This course is an introduction of the foundations of discrete mathematics. Topics include functions, relations, sets, simple proof techniques, Boolean algebra, fundamentals of logic, partial orders, elementary number theory and the fundamentals of counting etc.

Required Textbook(s)

Susanna S. Epp, Discrete Mathematics with Applications, fifth edition, ISBN: 978-1-337-69419-3

Prerequisites

Pre-calculus Math.

Course Outline

Please note that the outline is meant to give an overview of the major concepts in this course. Changes may occur as needed to aid in the student's development.

Module 1: Logic and Logical Reasoning

Students will be able to analyze mathematical statements using logical connectives, truth tables, predicates, and quantifiers, and determine logical equivalence and validity.

- Propositional logic and logical equivalence Predicates and quantifiers (2.1, 2.2, 3.1, 3.2)
 - Homework 1&2
 - Quiz 1

Module 2: Proof Techniques and Induction

Students will be able to construct clear and rigorous mathematical proofs using standard proof techniques, including direct proof, contradiction, contrapositive, and mathematical induction.

- Methods of proof Properties of the integers Mathematical induction (weak and strong) (4.1, 4.3, 5.2)
 - Homework 3&4
 - Quiz 2

Module 3: Recursion and Recurrence Relations

Students will be able to define recursive processes and analyze and solve recurrence relations arising in discrete models.

- Recursive definitions Recurrence relations Applications to counting and algorithms (5.6)
 - Homework 5
 - Quiz 3

Module 4: Sets, Functions, and Discrete Structures

Students will be able to apply set theory and function concepts to model relationships among discrete objects.

- Set theory and set operations Cartesian products Functions and function notation
One-to-one and onto functions (6.1, 7.1, 7.2)
 - **Homework 6-8**
 - **Quiz 4**

Module 5: Relations and Modular Arithmetic

Students will be able to analyze relations, equivalence classes, partial orders, and perform computations using modular arithmetic.

- Relations and their properties Equivalence relations and partial orders Modular arithmetic and introductory rings (8.1, 8.2, 8.3, 8.4)
 - **Homework 9-11**
 - **Quiz 5**
 - **Midterm Exam**

Module 6: Counting Techniques

Students will be able to solve counting problems using fundamental counting principles, permutations, combinations, and the principle of inclusion and exclusion.

- Fundamental principles of counting Permutations and combinations Principle of inclusion and exclusion (9.1, 9.2, 9.3)
 - **Homework 12-14**
 - **Quiz 6**

Module 7: Graph Theory and Trees

Students will be able to model and analyze problems using graphs and trees, including connectivity and hierarchical structures.

- Graph terminology and representations Paths, cycles, and connectivity Trees and spanning trees (10.1, 10.2, 10.4, 10.5)

- **Homework15-18**

- **Quiz 7**

Module 8: Optimization, Logic Systems, and Computation

Students will be able to apply discrete mathematics concepts to optimization, Boolean logic, and finite state machines.

- Optimization and matching Boolean algebra and switching functions Languages and finite state machines Generating functions (10.6, 6.4, 12.1, 12.2)

- **Homework19-20**

- **Final Exam**

Grading Policy

Homework (20 total, 1% each)	20%
Module Quizzes (8 total, 4% each)	32%
Midterm	20%
Final exam	28%
Total	100%

Grading Scale

The instructor will use the grading system as applied by JNU:

Definition	Letter Grade	Score
Excellent	A	90~100
Good	B	80~89
Satisfactory	C	70~79
Poor	D	60~69
Failed	E	Below 60

Academic Integrity

As members of the Jinan University academic community, students are expected to be honest in all of their academic coursework and activities. Academic dishonesty, includes (but is not limited to) cheating on assignments or examinations; plagiarizing, i.e., misrepresenting as one's own work any work done by another; submitting the same paper, or a substantially similar paper, to meet the requirements of more than one course without the approval and consent of the instructors concerned; or sabotaging other students' work within these general definitions. Instructors, however, determine what constitutes academic misconduct in the courses they teach. Students found guilty of academic misconduct in any portion of the academic work face penalties that range from the lowering of their course grade to awarding a grade of E for the entire course.