暨南大學
JINAN UNIVERSITY

# 0701M240

# Introduction to Discrete Mathematics

**Instructor:** TBA

**E-mail:** TBA

**Time:** December 14, 2026 - January 15, 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.

## Course Goals

By the end of the course, students will be able to:

- Formulate and evaluate logical statements using propositional and predicate logic, and construct rigorous mathematical proofs using direct, indirect, and inductive methods.
- Model discrete structures using sets, functions, and relations, and apply these concepts to solve problems in computer science and mathematics.
- Apply combinatorial reasoning and counting techniques—including permutations,

combinations, and the principle of inclusion-exclusion — to analyze and solve real-world problems.

- Represent and analyze problems using graphs and trees, and apply concepts such as connectivity, paths, and optimization to computational scenarios.
- Utilize fundamental discrete tools—including modular arithmetic, Boolean algebra, recurrence relations, and finite state machines — to design and evaluate simple computational models and algorithms.

## 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.

- Topics: Propositional logic and logical equivalence Predicates and quantifiers
- Text Sections: 2.1, 2.2, 3.1, 3.2
- Assignment
- 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.

- Topics: Methods of proof Properties of the integers Mathematical induction (weak and strong)
- Text Sections: 4.1, 4.3, 5.2
- Assignment
- 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

- Topics: Recursive definitions Recurrence relations Applications to counting and algorithms
- Text Sections: 5.6
- Assignment
- 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.

- Topics: Set theory and set operations Cartesian products Functions and function notation One-to-one and onto functions
- Text Sections: 6.1, 7.1, 7.2
- Assignment
- 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.

- Topics: Relations and their properties Equivalence relations and partial orders Modular arithmetic and introductory rings
- Text Sections: 8.1, 8.2, 8.3, 8.4
- Assignment
- 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.

- Topics: Fundamental principles of counting Permutations and combinations Principle of inclusion and exclusion.
- Text Sections: 9.1, 9.2, 9.3
- Assignment
- 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.

- Topics: Graph terminology and representations Paths, cycles, and connectivity Trees and spanning trees
- Text Sections: 10.1, 10.2, 10.4, 10.5
- Assignment
- 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.

- Topics: Optimization and matching Boolean algebra and switching functions Languages and finite state machines Generating functions
- Text Sections: 10.6, 6.4, 12.1, 12.2
- Assignment
- Quiz 8
- Final Exam

## Grading Policy

| | |
|---|---|
| Final Exam | 29% |
| Midterm Exam | 20% |
| Homework Assignments (19 total, 1% each) | 19% |
| Module Quizzes (8 total, 4% each) | 32% |
| **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.