

King Fahd University of Petroleum & Minerals

College of Computing and Mathematics
Information and Computer Science Department



ICS 253 Discrete Structures Spring 2026 (252)

INSTRUCTORS

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DESCRIPTION

Propositional Logic, Propositional Equivalence, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference; Methods of Proof, Divisibility and the Fundamental Theorem of Arithmetic; Sets, Set Operations, Cardinality of Sets; Functions; Recurrence Relations, Solving Recurrence Relations, Equivalence Relations and Congruences, Sequences and Summations; Mathematical Induction, Strong Induction, Recursive Definitions and Structural Induction, Well-Ordering Principle; Basics of Counting, Pigeonhole Principle, Permutations and Combinations, Binomial Coefficients.

PREREQUISITES ICS 104 and MATH 102

COURSE OBJECTIVES

- Develop Mathematical Reasoning and Proof Construction Skills
- Master Fundamental Concepts of Discrete Mathematics
- Construct Rigorous Mathematical Proofs

COURSE LEARNING OUTCOMES

After completion of this course, the student should be able to:

1. Formulate and derive propositional/predicate logic expressions.
2. Comprehend the theoretical principles of sets and functions.
3. Construct mathematical proofs of statements in set theory, relations, and number theory.
4. Employ principles of counting and combinatorics in problem solving.
5. Formulate and solve recurrence relations.

CONTENTS

The following list is tentative and subjected to changes. Any change will be announced in the course Blackboard.

Chapters	Topics	Included Sections	Time
1	Logic and Proofs	1.1 – 1.7	4 weeks
2	Sets, Functions, Sequences and Sums	2.1 – 2.5	2.5 weeks
3	Number Theory	4.1 – 4.6	3 weeks
5	Induction and Recursion	5.1, 5.2 (up to Page 338)	1.5 weeks
6	Counting	6.1 – 6.4	2 weeks
8	Advanced Counting Techniques	8.1 (no dynamic prog), 8.2 (up to Theorem 2)	1 week

TEXTBOOK

K. H. Rosen, **Discrete Mathematics and Its Applications, 7th Ed.**

EVALUATION

Coursework	20%
Assignments (Common)	20%
Midterm Exam (Common, Week 8)	25%
Final Exam (Common, comprehensive)	35%

COURSE POLICIES

- **Coursework** includes participation, online/in-class discussions and activities, attendance, quizzes, and projects. Students are expected to be positively engaged in the learning process.
- **Course Blackboard, MS Teams, and Gradescope:** Students are required to periodically check the course Blackboard and download course material as needed.
 - Several resources will be posted through the Blackboard.
 - Blackboard will be used for calendar communication, posting grades, etc.
 - You may use MS Teams to talk to your classmates and your instructor.
 - Gradescope will be used to submit your homework assignments.
- **Attendance:** Regular attendance is a university requirement.
 - Attendance will be checked at each lecture.
 - Missing 20% of the classes will result in an automatic **DN grade** (without warning).
 - Late arrivals will disrupt the class session and will be counted as a miss if repeated.
 - Every unexcused absence may lead to a loss of 0.5% of total grade.
- **Late assignments:** are rejected or subjected to late penalty. See late submission policy on the Blackboard/Gradescope.
- **Re-grading policy:** If you have a complaint about any of your grades, discuss it with the instructor first, and officially submit a regrade request on Gradescope no later than 3 days of distributing the grades (except for the final). Only legitimate concerns on grading should be discussed.
- **Office Hours:**
 - Students are encouraged to use the office hours to clarify any part of the material that is not clear.
- **Academic honesty:**
 - Students are expected to abide by all the university regulations on academic honesty.
 - Cheating will be reported to the Department Chairman.
 - Although collaboration and sharing knowledge is highly encouraged, copying others' work without, either in part or full, is considered plagiarism. Whenever in doubt, review the university guidelines or consult the instructor.
- **Courtesy:**
 - Students are expected to be courteous toward their classmates and the instructor throughout the duration of this course (in-class and online).
 - Side-talks and text-messages during the class are prohibited.