King Saud University
College of Science
Mathematics Department

Form (H)
Short course description

Course title: Discrete Mathematics	Course number and code: MATH 151
Previous course requirement: MATH 150	Language of the course: English
Course level: **3**	Effective hours: 3 (3+2+0)

Course description

Students are introduced to:

Basic concepts of elementary logic: statements and statement forms, connectives, logical equivalence, truth tables; converse, inverse and contrapositive of a conditional statement. Tautologies and contradictions. Universal and existential statements. Methods of proof: direct proof, proof by cases, proof by contrapositive, proof by contradiction, first and second principles of mathematical induction.
-Relations: general definitions, digraph and matrix of a relation; reflexive, symmetric, antisymmetric and transitive relations. Equivalence relations and partitions. Order relations and Hasse diagrams. Boolean algebras: general definitions, Boolean functions, complete sum of products form, complete product of sums form. Karnaugh maps, minimal sum of products form and minimal product of sums form. Gates and design of logic circuits. Graph theory: basic definitions and examples, paths, cycles, connected graphs, subgraphs. Regular, complete and bipartite graphs. Isomorphism of simple graphs. Trees, spanning trees, breadth-first search and depth-first search.

Course objectives: The course aims to introduce the following concepts

Elementary logic and methods of proof.
Relations
Boolean algebras
Introductory graph theory

Learning outcomes (understanding, knowledge, and intellectual and scientific skills)
After studying this course, the student is expected to be able to:

Outline fundamental concepts of mathematical logic.
Represent relations in various ways, and perform operations on them.
Recognize basic properties of Boolean algebras and Boolean functions.
Design logic networks and optimize costs using different algorithms and techniques.
Summarize certain basic concepts in graph theory, some special types of graphs, as well as some important typical applications of graph theory.
Summarize certain notions related to trees, spanning trees and algorithms of find breadth-first and depth-first search trees, as well as typical applications of trees.

Textbook adopted and supporting references

Discrete mathematics and its applications.	K.H. Rosen, McGraw-Hill	
Discrete and combinatorial mathematics: an applied introduction	R.P. Grimaldi ; Addison-Wesley	