

Planning and Quality Assurance Affairs

Form (A)

Course Specifications

General Information

Course name	Discrete Mathematics
Course number	MATH2307
Faculty	
Department	
Course type	Major Needs
Course level	2
Credit hours (theoretical)	3
Credit hours (practical)	0
Course Prerequisites	

Course Objectives

- 1 - Write and interpret mathematical notation and mathematical definitions
- 2 - Recognize the connection between set operations and logic
- 3 - Help student to solve problems in computer science
- 4 - Use effectively algebraic techniques to analyse basic structures
- 5 - Understand some basic properties of graphs and related discrete structures and relate them to practical examples

Intended Learning Outcomes

Knowledge and Understanding	<ul style="list-style-type: none">* a1. explore the concept of binary relations and their connection with direct graphs* a2. understand the issue of reachability* a3. have a good understanding of functions* a4. apply different properties of injective, surjective, bijective, composite, and inverse functions* a5. solve discrete mathematics problems that involve permutations and combinations* a6. to formulate short proof using direct proof, indirect proof, proof by contradiction* a7. understand algebraic expressions, codes and information chains* a8. find an explicit formula for the sequence* a9. calculate sequence values when an explicit formula is not available
Intellectual Skills	<ul style="list-style-type: none">* b1. apply the knowledge and skills to investigate and solve a variety of discrete mathematical problems* b2. understand the notion of mathematical thinking to be able to solve a wide range of problems* b3. recognize the connection between set operations and logic
Professional Skills	<ul style="list-style-type: none">* c1. study logical and algebraic relationships between discrete objects* c2. provide student with all necessary background in relations and functions for any mathematical field* c4. use algebraic techniques to analyze basic structures* c5. use discrete mathematics in computer science* c6. analyze problems that have sequence solutions* c7. solve problems in computer science and probability theory* c8. prove several theorems in mathematics
General Skill	<ul style="list-style-type: none">* d1. learn student to become effective communicator and a team leader* d2. learn students to work together productively and cooperatively* d3. communicate mathematics

Course Contents

1 - Directed graph and relations: directed graphs- relations- transitive closure and connectively relations- matrix representation of diagraphs and relations
2 - Relations and functions: equivalence relation and partial orderings- extremal elements in a partially ordered setset- functions- special functions
3 - Combinatorics and finite probability: basic counting techniques- permutations- combination
4 - logic and proof:propositional logic- logical equivalence and tautologyies- proof techniques- introduction to mathematical induction
5 - Graph and trees: graphs- paths, circuits, and cycles- trees- spanning trees
6 - Recurrence relations and generating functionsecurrence Relation: recursion and recurrence relations- recurrence relations and characteristic equation methods- recurrence relation and generating function

Teaching and Learning Methods

1 - lectures
2 - exercises

Students Assessment

<u>Assessment Method</u>	<u>TIME</u>	<u>MARKS</u>
First mid-term	Week 6	25%
Second mid-term	Week 10	25%
Final Exam	Week 16	50%

Books and References

Essential books	William Barnier. Jean B.Chan; Discrete Mathematics with applications, West PUBLISHING Company
Recommended books	Kenneth H. Rosen, Discrete Mathematics and its applications; McGraw Hill Science

Knowledge and Skills Matrix

Main Course Contents	Study Week	Knowledge and Understanding	Intellectual Skills	Professional Skills	General Skill
directed graphs- relations -transitive closure and connectively relation- matrix representation of diagraphs and relations	1-3	a1, a2	b1, b2	c2	d1,d2, d3
equivalence relation and partial orderings- extremal elements in a partially ordered set- functions- special functions	4-6	a3, a4	b1, b2	c1, c2	d1, d2, d3
basic counting techniques- permutations- combinations	7-8	a5	b1, b2	c7	d1, d2, d3
propositional logic- logical equivalence and tautology- proof techniques- introduction to mathematical induction	9-10	a6	b1, b2	c8	d1, d2, d3
graphs- paths, circuits, and cycles- trees- spanning trees	11-12	a7	b1, b2	c4, c5	d1, d2
recursion and recurrence relations- recurrence relation and characteristic equation method- recurrence relation and generating functions	13-15	a8, a9	b1, b2	c6	d1, d2