



Planning and Quality Assurance Affairs

Form (A)

Course Specifications

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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 defenitions
- 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	 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	 b1. apply the knowledge and skills to invistigate 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	 * 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 mathmatics 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	* 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 Combinatories 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 relationsrecurrence relations and characteristic equation methods- recurrence relation and generating function

Teaching and Learning Methods

- 1 lectures
- 2 exercises

Students Assessment

Assessment Method	<u>TIME</u>	MARKS
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 Puplishing 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 orderded set- functions- special functions	4-6	a3, a4	b1, b2	c1, c2	d1, d2, d3
basic counting techniques- permutations- combinations	7-8	а5	b1, b2	с7	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	а7	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