Discrete Mathematics Course Definition Form

Syrian Arab Republic		الجمهوريّة العربيّة السوريّة
Ministry of Higher Education		وزارة التعليـم العـالـــــي
Syrian Virtual University		الجامعة الافتراضيّة السوريّة

1. Basic Information:

Course Name	Discrete Mathematics
Course ID	GMA204
Contact Hours (Registered Sessions)	36
Contact Hours (Synchronized Sessions)	18
Mid Term Exam	There is not
Exam	1.5
Registered Sessions Work Load	36
Synchronized Session Work Load	18
Credit Hours	6

2. Pre-Requisites:

Course	ID
Mathematical Algebra	GMA101
Mathematical Analysis	GMA102

3. Course General Objectives:

This course aims at introducing students to the logic involved in the study of computer science and various techniques of mathematics proof, especially reasoning. Students will be introduced to Boolean algebra and relevant theories, and its applications in the design of digital circuits using logical gates, to number theory and its applications in encryption, to relations, their representation and types, including equivalence relations and partial ordering, to the concept of the algorithm, types of algorithms and different ways to represent them and algorithm complexity calculation, to graphs, their properties and some basic algorithms as finding the shortest path, and finally to trees, types of trees including binary research trees, decision trees, Hoffman coding and some algorithms of minimum cost.

3. Intended Learning Outcomes (ILO):

Code	Intended Learning Outcomes
ILO1	Understand logic, propositional logic and its negation, direct and indirect proofs, and mathematical induction
ILO2	Identify Boolean algebra, Boolean function and its simplification and realization using digital gates
ILO3	Identify Number theory and its applications in encryption
ILO4	Identify relations, their representation and types, equivalence relations and partial ordering
ILO5	Understand the basic concept of algorithms, types and d algorithm complexity calculation
ILO6	Identify the basic properties of graphs, and some basic algorithms as finding the shortest path
ILO7	Identify trees, types of trees, binary research trees, and some algorithms of minimum cost

5. Course Syllabus (18 hours of total synchronized sessions)

RS: Recorded Sessions; SS: Synchronized Sessions;

ILO	Course Syllabus	RS	SS	Type	Additional Notes
ILO1	Logic and Proofs • basic logical operations • conditional statements and propositional equivalences	4	1.5	☒ Exercises	
ILO1	Introduction to proofs • direct proof • indirect proof • different types of proofs	2	1.5	☒ Exercises	

ILO1	mathematical induction • classical mathematical induction • strong induction	3	1.5	☒ Exercises	
ILO2	Boolean algebra • properties of Boolean algebra • Boolean functions, representation and simplification	3	1.5	☒ Exercises	
ILO3	Number theory and cryptography • Euclidean division and congruences • GCD, LCM and prime numbers • solving congruences • applications of congruences • classical cryptography • representations of integers	6	3.0	☒ Exercises	
ILO4	Relations Relations, representation and types equivalence relations and partial ordering	3	1.5	☒ Exercises	
ILO5	Algorithms • algorithm types • growth of functions • complexity of algorithms	3	1.5	☒ Exercises	
ILO6	Graphs • properties, types and	6	3.0	☒ Exercises	

	representation • connectivity • Euler and Hamilton paths • shortest path problems				
ILO7	Trees • trees and applications • binary trees • binary search trees • tree traversal • algorithms of minimum cost	6	3	☒ Exercises	

6. Assessment Criteria (Related to ILOs)

ISC	Interactive Synchronized Collaboration		Ex	Exams		Rpt	Reports
PF2F	Presentations and Face-to-Face Assessments		PW	Practice Work			

ILO Code	ILO	Intended Results	Assessment Type	
			ISC	Ex
ILO1	Understand logic, propositional logic and its negation, direct and indirect proofs, and mathematical induction	1. truth table for compound proposition 2. equivalences of 2 propositions 3. truth table for a quantifier, negation of a quantifier 4. theorem proof 5. proof using induction	X	X
ILO2	Identify Boolean algebra, Boolean function and its	1. simplification of a Boolean function	X	X

	simplification and realization using digital gates	2. representation of a Boolean function 3. conversion between Boolean function forms 4. realization of a Boolean function using digital gates		
ILO3	Identify number theory and its applications in encryption	1. Euclidean division 2. Bézout's coefficients calculation 3. solving congruence equations 4. representations of an integer in base b	X	X
ILO4	Identify relations, their representation and types, equivalence relations and partial ordering	1. composition of binary relations 2. finding equivalence classes 3. partial ordering	X	X
ILO5	Understand the basic concept of algorithms, types and d algorithm complexity calculation	1. execution of simple searching and sorting algorithms 2. algorithms complexity calculation	X	X
ILO6	Identify the basic properties of graphs, and some basic algorithms as finding the shortest path	1. drawing and representation of graphs 2. connectivity of graphs 3. Finding Euler and Hamilton paths and circuits 4. Solving the shortest path problem 5. traveling salesman	X	X
ILO7	Identify trees, types of trees,	1. binary trees and its properties	X	X

	binary research trees, and some algorithms of minimum cost	2. building binary search trees 3. decision trees 4. Huffman coding 5. Finding spanning trees		

7. Practice Tools:

Tool Name	Description

8. Main References

McGraw.Hill.Discrete.Mathematics.and.Its.Applications.7th.Edition.Jun.2011

Mano_Digital.Design.5E_0, 2011

9. Additional References