



MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Discrete Mathematics		Module Delivery	
Module Type	Core		☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	CYS133			
ECTS Credits	4			
SWL (hr/sem)	100			
Module Level	1	Semester of Delivery		2
Administering Department	Dept. of Cybersecurity		College	College of Information Technology
Module Leader	Dr. Ahmed Hadi Ali		e-mail	ahmed_hadi@uofallujah.edu.iq
Module Leader's Acad. Title	Lect.		Module Leader's Qualification	Ph.D.
Module Tutor	Dr. Ahmed Hadi Ali		e-mail	ahmed_hadi@uofallujah.edu.iq
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Scientific Committee Approval Date	25-5-2026		Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1. Introduce fundamental discrete mathematics structures used in computer science. 2. Develop logical reasoning and analytical thinking. 3. Explain propositional and predicate logic. 4. Describe set theory concepts. 5. Analyze matrices, relations, functions, and recursion. 6. Introduce graph theory, trees, and coding systems. 7. Develop practical skills in solving discrete mathematics problems. 8. Provide mathematical foundation for algorithms, cybersecurity, and computational problem solving.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain the fundamental concepts of discrete mathematics and its role in computer science. 2. Construct and analyze logical propositions and truth tables. 3. Apply laws of logic to simplify logical expressions. 4. Apply set theory concepts and perform set operations. 5. Apply matrices and matrix-based representations in discrete mathematics. 6. Analyze relations and functions and their properties. 7. Solve recurrence relations and recursive problems. 8. Analyze graphs and tree structures used in computing applications. 9. Apply coding-system concepts such as Hamming distance and encoding/decoding principles.
Indicative Contents المحتويات الإرشادية	• Mathematical Logic: Propositions, logical operators, truth tables, logical equivalence, implication, biconditional statements, predicates and quantifiers. • Set Theory: Sets and subsets, set operations, identities of sets, power sets, Cartesian products, and Venn diagrams. • Matrices: Matrices, matrix operations, determinants, inverse matrices, and matrix representation of discrete structures. • Relations and Functions: Relations on sets, properties of relations, equivalence relations, partial order relations, functions, and matrix representation of relations. • Recurrence Relations and Recursion: Definition of recurrence relations, homogeneous and non-homogeneous recurrence relations, recursive algorithms, and Fibonacci sequence. • Graph Theory and Trees: Basic graph terminology, directed and undirected graphs, paths, connectivity, graph representations, tree structures, and binary trees. • Coding Systems: Hamming distance, Boolean functions, and introductory encoding/decoding concepts.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Conceptual lectures to explain the theoretical foundations of discrete mathematics. • Guided problem-solving sessions to develop students' analytical and logical thinking skills. • Laboratory exercises to model propositions, sets, matrices, relations, recursion, graphs, and trees. • Regular quizzes, assignments, and short tasks to evaluate students' understanding of course concepts. • Use of electronic learning resources, online materials, and e-learning tools to support independent learning.

Student Workload (SWL) الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2, #3, #4
	Assignments	2	10% (10)	2 and 12	LO #3, #4, #5
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	2	10% (10)	13	LO #6 - #8
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction
Week 2	Propositional Logic
Week 3	Truth Tables and Logical Laws
Week 4	Predicate Logic
Week 5	Sets and Set Operations
Week 6	Cartesian Product and Counting Principles
Week 7	Matrices and Matrix Operations
Week 8	Relations and Matrix Representation of Relations
Week 9	Functions
Week 10	Recursion and Recurrence Relations
Week 11	Graph Theory
Week 12	Trees
Week 13	Binary Trees
Week 14	Coding Systems
Week 15	Review

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to Python (Getting Started)
Week 2	Python Statements
Week 3	Python Variables
Week 4	Python Data Types
Week 5	Python Numbers
Week 6	Python Strings
Week 7	Python Booleans & Operators
Week 8	Python If Statements
Week 9	Python Loops (for & while)

Week 10	Python Lists
Week 11	Python Tuples
Week 12	Python Sets
Week 13	Python Dictionaries
Week 14	Python Arrays
Week 15	Python Functions

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Discrete Mathematics and Its Applications – Kenneth H. Rosen	Yes
Recommended Texts	Discrete Mathematics with Applications – Susanna S. Epp	Yes
Websites		

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.