



MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية



Module Information				
معلومات المادة الدراسية				
Module Title	Discrete Mathematics		Module Delivery	
Module Type	C		☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☒ Practical ☐ Seminar	
Module Code	AI1212			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	1	Semester of Delivery		2
Administering Department	AI	College	CSIT	
Module Leader	Elaf Ali Sfook		e-mail	elaf.ali@uowa.edu.iq
Module Leader's Acad. Title	Assist Lecturer		Module Leader's Qualification	MS.c
Module Tutor	Elaf Ali Sfook		e-mail	elaf.ali@uowa.edu.iq
Peer Reviewer Name	Mahmood Jasim		e-mail	mahmood.jasim@uowa.edu.iq
Scientific Committee Approval Date	01/03/2026	Version Number	1.0	

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	-	Semester	1
Co-requisites module	None	Semester	


 م.م. عارف محمود علي
 مقر قسم الرياضيات
 ٢٠٢٦ - ٢٠٢٥




 د.م.د. محمد علي لافانسي
 العميد
 ٢٠٢٦ - ٢٠٢٥

Department Head Approval

Dean of the College Approval

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This module aims to: 1. Provide students with fundamental concepts of Discrete Mathematics that are essential for computer science and artificial intelligence. 2. Develop logical thinking and mathematical reasoning skills required for problem solving in computing fields. 3. Introduce key mathematical structures such as sets, relations, functions, logic, combinatorics, and graphs. 4. Enable students to apply discrete mathematical techniques in analyzing algorithms, data structures, and computational problems. 5. Prepare students with the mathematical background necessary for advanced subjects such as algorithms, cryptography, data science, and artificial intelligence.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After successfully completing this module, students will be able to: Knowledge and Understanding 1. Explain the fundamental principles of propositional logic and predicate logic. 2. Describe mathematical structures such as sets, relations, and functions. 3. Understand principles of counting techniques and combinatorics. 4. Explain the basic concepts of graph theory and trees used in computer science.
Indicative Contents المحتويات الإرشادية	The module will typically cover the following topics: 1. Introduction to Discrete Mathematics ○ Importance in computer science and AI ○ Discrete vs continuous mathematics 2. Logic and Propositional Logic ○ Logical statements ○ Truth tables ○ Logical equivalence ○ Predicate logic ○ Quantifiers 3. Set Theory ○ Sets and subsets ○ Set operations ○ Venn diagrams ○ Cartesian products 4. Relations and Functions ○ Types of relations ○ Equivalence relations ○ Partial orders ○ Functions and types of functions 5. Counting Techniques and Combinatorics ○ Permutations ○ Combinations ○ Pigeonhole principle ○ Binomial theorem 6. Graph Theory ○ Graph terminology

	○ Types of graphs ○ Graph representation ○ Graph traversal 7. Trees ○ Tree structures ○ Binary trees ○ Applications in computer science 8. Introduction to Recurrence Relations ○ Recursive definitions ○ Solving simple recurrence relations
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The teaching and learning strategies used in this module aim to develop students' analytical and logical thinking skills required in computer science and artificial intelligence. The following strategies will be adopted: 1. Lectures Formal lectures will be used to introduce the fundamental concepts of discrete mathematics such as logic, set theory, relations, combinatorics, and graph theory. Visual examples and explanations will be used to clarify abstract mathematical ideas. 2. Tutorials Tutorial sessions will focus on solving mathematical problems and exercises related to the topics covered in lectures. Students will practice applying theoretical concepts to different problem-solving scenarios. 3. Practical Exercises Students will engage in structured problem-solving activities individually or in small groups to strengthen their understanding of discrete structures and mathematical reasoning. 4. Interactive Learning Class discussions and question-answer sessions will be used to encourage students to actively participate and develop critical thinking and logical analysis. 5. Problem-Based Learning Students will be given computational and logical problems that require applying discrete mathematics techniques to find solutions. 6. Self-Learning Students will be encouraged to study additional examples and exercises outside the classroom using recommended textbooks and online resources to reinforce their understanding of the module topics.

Student Workload (SWL)			
الحمل الدراسي للطلاب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	102	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	7
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	150		

Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	15% (15)	2,4,5,9,11	LO #1, #2 and #4
	Assignments	5	15% (15)	3,6,8,12,13	LO #3, and #4
	Projects / Lab.	-	-	-	-
	Report	1	10% (10)	13	All
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Abstract of discrete mathematics
Week 2	Set theory
Week 3	Solve some example
Week 4	Logic
Week 5	Solve some example
Week 6	Functions
Week 7	Mid-term Exam
Week 8	Relation
Week 9	Some examples
Week 10	Graph theory
Week 11	Some example

Week 12	Tree
Week 13	Solve example
Week 14	Solve example
Week 15	Review
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Discrete Mathematics and Its Applications by Kenneth H. Rosen.	NO
Recommended Texts	Concrete Mathematics: A Foundation for Computer Science by Ronald Graham, Donald Knuth, and Oren Patashnik.	NO
Websites	https://www.google.com/search?q=https://www.combinatorica.com/	

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.