



Ministry of Higher Education and
Scientific Research - Iraq
University of Diyala
College of Engineering for Artificial
Intelligence Technology
Department of Cybersecurity Engineering



الملحق ٤: وصف المادة الدراسية

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Discrete Mathematics		Module Delivery
Module Type	Basic		☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	CSE 201		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	2	Semester of Delivery	
Administering Department	Cybersecurity Eng.	College	College of Artificial Intelligence Engineering Technology
Module Leader	Ali N. Albu-Rghaif	e-mail	ali.alburghaif@uodiyala.edu.iq
Module Leader's Acad. Title	Asst. Professor	Module Leader's Qualification	Ph.D.
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	14/05/2026	Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	E 102	Semester	2
Co-requisites module		Semester	



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Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	By the end of this module, students will be able to: 1. Understand the fundamental concepts of discrete mathematical structures used in computer science and cybersecurity. 2. Apply logical reasoning and proof techniques to solve computational problems. 3. Analyze relations, functions, and algebraic structures relevant to information systems. 4. Use combinatorial methods and recurrence relations in algorithmic problem solving. 5. Model real-world and computing problems using graph theory and finite-state systems. 6. Develop analytical and problem-solving skills required for advanced studies in algorithms, data science, networking, and cybersecurity.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this module, students should be able to: 1. Explain the principles of mathematical logic, predicates, and inference rules. 2. Apply set theory, relations, and functions to computational problems. 3. Analyze combinatorial structures and counting techniques. 4. Solve recurrence relations using appropriate mathematical methods. 5. Represent and analyze graphs, trees, and network structures. 6. Utilize graph algorithms and graph coloring concepts in practical applications. 7. Describe finite-state machines and finite automata concepts. 8. Relate discrete mathematical concepts to computer science and cybersecurity applications.
Indicative Contents المحتويات الإرشادية	• Mathematical Logic and Logical Reasoning • Propositional Logic and Truth Tables • Predicates and Quantifiers • Rules of Inference and Proof Techniques • Set Theory and Set Operations • Relations and Their Properties • Functions and Types of Functions • Boolean Algebra and Algebraic Structures • Elementary Combinatorics and Counting Principles • Binomial Coefficients and Counting Applications • Pigeonhole Principle • Recurrence Relations and Their Solutions • Graph Theory and Graph Representations • Trees, Traversals, and Spanning Trees • Euler Circuits and Multigraphs • Chromatic Numbers and Graph Coloring • Finite State Machines and Finite Automata • Applications in Computing, Networks, and Cybersecurity



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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The module will be delivered using a combination of: • Interactive lectures and classroom discussions. • Problem-solving sessions and mathematical exercises. • Individual and group assignments. • Practical examples related to computer science and cybersecurity. • Blackboard demonstrations and presentation slides. • Continuous assessment through quizzes, homework, and examinations.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	10% (2)	2 and 13	LO #1 - #7
	Assignments	1	10% (10)	11 and 14	LO # 7 and #8
	Class work	5	10% (2)		
	Home work	5	5% (1)		
	Projects / Lab.				
	Report	1	5% (5)		
Summative assessment	Midterm Exam	1 hr	10% (10)	9	LO #1 - #6
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		



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Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Discrete Mathematics and Set Theory
Week 2	Mathematical Logic and Logical Equivalences
Week 3	Predicates and Quantifiers
Week 4	Rules of Inference and Proof Techniques
Week 5	Relations and Their Properties
Week 6	Functions and Types of Functions
Week 7	Algebraic Structures and Boolean Algebra
Week 8	Elementary Combinatory and Counting Principles
Week 9	Binomial Coefficients and Pigeonhole Principle
Week 10	Recurrence Relations
Week 11	Solving Recurrence Relations
Week 12	Graph Theory and Graph Representations
Week 13	Trees, Multigraphs, and Euler Circuits
Week 14	Chromatic Numbers and Graph Coloring
Week 15	Finite State Machines, Finite Automata, and Applications in Computing and Cybersecurity
Week 16	Preparatory week before the final Exam.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	



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Week 8	
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	
Week 15	

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	- Discrete Mathematics and Its Applications by Kenneth H. Rosen - Discrete and Combinatorial Mathematics by Ralph P. Grimaldi - Schaum's Outline of Discrete Mathematics by Seymour Lipschutz and Marc Lipson	Yes
Recommended Texts	- Discrete Mathematics for Computer Scientists by Mordechai Ben-Ari - Applied Discrete Structures by Alan Doerr and Kenneth Levasseur - Discrete Mathematics with Applications by Susanna S. Epp	Yes
Websites	MIT OpenCourseWare – Mathematics for Computer Science Khan Academy – Discrete Mathematics Resources GeeksforGeeks – Discrete Mathematics Tutorials Brilliant – Logic and Discrete Mathematics NIST Computer Security Resource Center (for applied concepts related to computing and cybersecurity)	



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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.