MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Computational Theory**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**AI2104**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		2	**Semester of Delivery**		1
Administering Department		AI	**College**	Computer Science and Information Technology	
Module Leader	Ali Kareem		**e-mail**	ali.kaream@uowa.edu.iq	
Module Leader's Acad. Title		lecturer	**Module Leader's Qualification**		Ph.D
Module Tutor	Ali Kareem		**e-mail**	ali.kaream@uowa.edu.iq	
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Scientific Committee Approval Date		01/09/2026	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	---	**Semester**	--
Co-requisites module		**Semester**	

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	Finite automata are useful models for many important kinds of hardware and software. Here are the most important kinds: Software for designing and checking the behavior of digital circuits; The “lexical analyzer” of a typical complier, that is, the compiler component that breaks the input text into logical units, such as identifiers, keywords, and punctuation; Software for scanning large bodies of text, such as collections of Web pages, to find occurrences of words, phrases, or other patterns; Software for verifying systems of all types that have a finite number of distinct states, such as communication protocols or protocols for secure exchange of information.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Knowledge and understanding a. Acquire a full understanding and mentality of Automata Theory as the basis of all computer science 2. languages design a. Have a clear understanding of the Automata theory concepts such as RE's, DFA's, NFA's, Stack's, Turing machines, and Grammars 3. Cognitive skills (thinking and analysis). a. Be able to design FAs, NFAs, Grammars, languages modelling, small compilers basics b. Be able to design sample automata 4. Communication skills (personal and academic). a. Be able to minimize FA's and Grammars of Context Free Languages 5. Practical and subject specific skills (Transferable Skills).
Indicative Contents المحتويات الإرشادية	● Training in the applied use of key coding languages for creative computing ● Training in key frameworks for creative computing ● Introduction to online collaboration for creative computing

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Class discussions with examples.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Basic concepts and definitions; Set operations; partition of a set
Week 2	Central concepts of Automata Theory.
Week 3	Regular Expressions; Operations on Regular expressions
Week 4	Finite Automata and Regular Expressions.
Week 5	Deterministic Finite Automata (DFA) and Non-Deterministic Finite Automata (NDFA)
Week 6	Equivalence of Deterministic and Non-Deterministic Finite Automata.
Week 7	Finite Automata with Epsilon-Transition. Equivalence between DFA, NFA, NFA-Λ
Week 8	Conversion from FA and regular expressions.
Week 9	Mealy and Moore Machines
Week 10	Conversion between mealy and Moore machines
Week 11	Reglual grammar and Context-Free Grammars
Week 12	Parse Trees; Ambiguity in Grammars and Languages
Week 13	Standard Forms; Chomsky Normal Forms;
Week 14	Chomsky normal form
Week 15	Greibach normal Forms.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Introduction to Computer Theory, Daniel I. A. Cohen, Prentice-Hall, Second Edition, 1997.	Yes
Recommended Texts	JohnE.Hopcroft, RajeevMotwani, JeffreyD.Ullman: Introduc-tiontoAutomataTheory,Languages, and Computation; Addison Wesley,2000.	No
Websites	https://www.coursera.org/courses?query=theory%20of%20computation	

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.