Ministry of Higher Education

Al-Zahrawi University

Faculty of Science

Department of Artificial Intelligence Sciences

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Problem solving in AI**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ZU-SC-AI-1A-PRO				
ECTS Credits	**4**				
SWL (hr/sem)	**125**				
Module Level	UG – Year 1		**Semester of Delivery**	First Semester	
Administering Department	Artificial Intelligence		**College**	College of Science	
Module Leader	د. محمد عبد العزيز		**e-mail**	mohammed.abdallazez@uokerbala.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**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	This module aims to: 1. Develop students' ability to analyze and structure AI problems formally. 2. Introduce classical and modern AI problem-solving frameworks. 3. Train students in heuristic, logical, and cognitive problem-solving techniques. 4. Enable students to model problems using representations suitable for AI systems. 5. Compare human and machine problem-solving processes. 6. Prepare students to solve real AI problems using systematic reasoning strategies.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**Upon successful completion of this module, students will be able to:** **LO1:** Explain the role of problem solving in Artificial Intelligence. **LO2:** Classify Artificial Intelligence problems based on their nature, structure, and complexity. **LO3:** Apply Polya's problem-solving steps to analyze and solve AI problems. **LO4:** Represent AI problems using states, goals, constraints, and problem spaces. **LO5:** Apply standard Artificial Intelligence problem-solving techniques. **LO6:** Use deduction, induction, and abduction in AI reasoning and problem solving. **LO7:** Apply heuristic methods to guide and improve AI problem-solving processes. **LO8:** Explain the Human Window concept and its role in intelligent problem solving. **LO9:** Solve Classical AI Problem Case Study I using systematic problem-solving strategies. **LO10:** Solve Classical AI Problem Case Study II using structured AI reasoning methods. **LO11:** Solve Classical AI Problem Case Study III using heuristic and logical approaches. **LO12:** Solve Classical AI Problem Case Study IV using advanced AI problem-solving techniques. **LO13:** Compare and evaluate human and machine approaches to problem solving.
Indicative Contents المحتويات الإرشادية	**Part A – Foundations of Problem Solving (12 hours)** – AI and problem solving – Types and nature of problems

	– Polya's methodology **Part B – Problem Representation and Techniques (18 hours)** – State-space and goal representation – Problem-solving techniques **Part C – Reasoning Methods (15 hours)** – Deduction – Induction – Abduction **Part D – Heuristics and Cognitive Models (18 hours)** – Heuristics for search and reasoning – Human Window concept **Part E – Classical AI Problem Solving (15 hours)** – Case Study I – Case Study II – Case Study III – Case Study IV – Human vs Machine problem solving

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Teaching is delivered through lectures and guided problem-solving sessions using: – Conceptual explanations – Step-by-step problem decomposition – AI-based examples – Case studies – Continuous feedback These strategies develop analytical, logical, and strategic thinking required in AI.

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	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.1
Total SWL (h/sem)	**125**		

الحمل الدراسي الكلي للطالب خلال الفصل	

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	5% (10)	4 and 10	LO1–LO3, LO7–LO9
	Assignments	2	5% (10)	7 and 12	LO1–LO6, LO7-10
	Projects	2	5% (10)	14	L1-L7 , L8-L13
	Report	1	10% (10)	14	LO11–LO13
Summative assessment	Midterm Exam	1 hrs	10% (10)	8	LO1–LO7
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	AI and the Role of Problem Solving
Week 2	Nature and Classification of Problems
Week 3	Polya's problem-solving steps
Week 4	Problem Understanding and Representation
Week 5	Problem-solving Techniques
Week 6	Deduction, Induction, Abduction
Week 7	Midterm Exam
Week 8	Heuristics For Problem-Solving
Week 9	The Human Window Concept
Week 10	Classical AI Problem Case Study I
Week 11	Classical AI Problem Case Study II
Week 12	Classical AI Problem Case Study III
Week 13	Classical AI Problem Case Study IV

Week 14	Human vs. Machine Problem Solving
Week 15	Revision
Week 16	Preparatory Week for Final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Kopec, D., Pileggi, C., Ungar, D., & Shetty, S. Artificial Intelligence and Problem Solving. In Artificial Intelligence and Problem Solving. Mercury Learning and Information (2017).	Yes
Recommended Texts	Russell, Stuart J., and Peter Norvig. "Artificial Intelligence: A Modern Approach, Global Edition 4e." (2021).	Yes
Websites	https://aimacode.github.io/aima-exercises/	

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.