University/Academy: Arab Academy for Science and Technology & Maritime Transport
Faculty/Institute: College of Computing and Information Technology
Program: Computer Science / Software Engineering / Information Systems

Form No. (12)
Course Specification

1- Course Data

Course Code: CS366	Course Title: **: Introduction to Artificial Intelligence**	Academic Year/Level: Year 3 / Semester 6
Specialization: Computer Science	No. of Instructional Units: 2 hrs lecture 2 hrs lab	Lecture:

2- Course Aim	AI : History and Goals – AI as Representation and search – Knowledge based systems – Logic (Propositional and Predicate) as a representation language – Prolog as an example of an AI language - Introduction to Machine Learning.

3- Intended Learning Outcome:

a- Knowledge and Understanding	**Students will be able to demonstrate knowledge of:** K4.Criteria and specifications appropriate to specific problems, and plan strategies for their solution. K7. Principals of generating tests which investigate the functionality of computer programs and computer systems and evaluating their results. K10. Current developments in computing and information research. • Define what is AI. (K4,K7,K10) • Show the AI model (K4,K7,K10) • List the application of AI (K4,K7,K10) • Define what is a state space (K4,K7,K10) • Know how to build a state space (K4,K7,K10) • Define Blind Search (K4,K7,K10) • List blind search techniques (K4,K7,K10) • Explain the need for heuristic search. (K4,K7,K10) • List the different heuristic search algorithms (K4,K7,K10) • Know the A* algorithm search strategy (K4,K7,K10) • Define Admissibility – Monotonicity – and Informedness(K4,K7,K10) • Know the min-max game playing algorithm (K4,K7,K10) • Show the game strategy for three players game. (K4,K7,K10) • Demonstrate the alpha beta pruning algorithm. (K4,K7,K10)

	• list the different knowledge representations. (K4,K7,K10) • Define the production rules (K4,K7,K10) • Define what an expert system is. (K4,K7,K10) • Define what propositional logic is(K4,K7,K10) • List the advantages and disadvantages of propositional logic(K4,K7,K10) • Define what first order logic is. (K4,K7,K10) • List the advantages and disadvantages of the first order logic(K4,K7,K10) • Show the resolution in FOL(K4,K7,K10) Define the soundness and completeness in FOL(K4,K7,K10)
b- Intellectual Skills	**By the end of the course, the student acquires high skills and an ability to understand:** I5. Make ideas, proposals and designs using rational and reasoned arguments for presentation of computing systems. I6. Evaluate the results of tests to investigate the functionality of computer systems. I10. Define traditional and nontraditional problems, set goals towards solving them, and. observe results. I11. Perform comparisons between (algorithms, methods, techniques...etc). • Solve some example problems using state space • Show the state space generated nodes using different blind search algorithms • Apply the heuristic search on an example problem • Detect the correct path to the solution based on the heuristic values. • Apply the A* on an example • Detect the shortest path to the goal • Show that A* is admissible • Show the informedness effect based on different heuristic functions • Apply the min-max algorithm on a sample game tree. • Calculate the alpha beta values at different levels of the tree. • Detect the branches to be pruned • Apply forward and backward reasoning on a set of production rules. • Construct a decision tree for an expert system. • Apply resolution on a set of propositional expressions. • Detect the Soundness and completeness in FOL • Apply resolution on a set of FOL expressions. • Differentiate between depth and breadth search • Compare the search space between blind and heuristic search • Analyze the effect of the pruning algorithm • Compare the results to results of the min-max algorithm
c- Professional Skills	**By the end of the course the student will have the ability to:** P2. Implement comprehensive computing knowledge and skills in projects and in deployment of computers to solve position practical problems. P3. Deploy the equipment and tools used for the construction,

	maintenance and documentation of computer applications. P5. Develop a range of fundamental research skills, through the use of online resources, technical repositories and library-based material P9. Use appropriate programming languages, web-based systems and tools, design methodologies, and knowledge and database systems. • Solve some example problems using state space (P2,P3,P5,P9) • Implement searching techniques (P2,P3,P5,P9) • Develop an expert system(P2,P3,P5,P9)
d- General Skills	**Students will be able to:** G1. Demonstrate the ability to make use of a range of learning resources and to manage one's own learning. G2.Demonstrate skills in group working, team management, time management and organizational skills. G3. Show the use of information-retrieval. G7.Show the use of general computing facilities. G8. Demonstrate skills in group working, team management, time management and organizational skills.
4- Course Content	Introduction to AI : Definition - History – Goals AI as Representation and Search. State Space. Search Strategy. Blind search techniques. Informed (Heuristic) search techniques : Hill Climbing – Best First A* Algorithm Admissibility – Monotonicity – Informedness of a heuristic function Game trees Alpha Beta Pruning Algorithm Knowledge Representation Expert systems & knowledge-based systems. Propositional Logic : Syntax – Semantic – Proof by resolution refutation. First Order Logic : Syntax – Semantic – First Order Logic : Resolution - Soundness – Completeness Presentation of projects and Final Exam.
5- Teaching and Learning Methods	Lectures, Labs, Projects, Individual study & self-learning.
6- Teaching and Learning Methods for Students with Special Needs	Students with special needs are requested to contact the college representative for special needs (currently Dr Hoda Mamdouh in room C504) Consulting with lecturer during office hours. Consulting with teaching assistant during office hours. Private Sessions for redelivering the lecture contents. For handicapped accessibility, please refer to program specification.
7- Student Assessment:	

a- Procedures used:	Exams and Individual Projects
b- Schedule:	Week 7 exam Week 12 exam Projects through the semester Week 16Final exam
c- Weighing of Assessment:	7th week exam 30% 12th week exam 20% project 10% Final exam 40%

8- List of References:

a- Course Notes	From the Moodle on www.aast.edu
b- Required Books (Textbooks)	Stuart Russell and Peter Norvig, *Artificial Intelligence: A modern Approach*, Pearson, 2nd edition, 2003.
c- Recommended Books	• Elaine Rich, Kevin Knight, *Artificial intelligence*, McGrawHill Inc, 1995 • Peter Jackson, *Introduction to Expert Systems*, Addison Wesley, 3rd edition, 1999. • Ivan Bratko*, Prolog programming for AI*, Addison Wesley, 3rd edition, 2000.
d- Periodicals, Web Sites, …, etc.	

Course Instructor: Head of Department:

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