



University/Academy: Arab Academy for Science, Technology & Maritime Transport
Faculty/Institute: College of Engineering & Technology
Program: B.Sc. Computer Engineering

Form no. (12): Course Specification

1- Course Data

Course Code: CC511	Course Title: Introduction to Artificial Intelligence	Academic Year/Level: 4th year / 7th semester
Specialization: Computer Engineering	No. of Instructional Units 3	Lecture 2
		Practical 2

2- Course Aim

- The aim of the course is to give a broad overview of AI techniques, so that when students go into industry or research, they will be able to choose the correct AI techniques for the problems which arise.

3- Intended Learning Outcomes

a- Knowledge and Understanding	<p>Through knowledge and understanding, students will be able to:</p> <p>a1. Concepts and theories of mathematics and sciences, appropriate to the computer engineering.</p> <ul style="list-style-type: none"> • Define what is AI. • Show the AI model • List the application of AI • Define what is a state space • Know how to build a state space • Define Blind Search • List blind search techniques • Explain the need for heuristic search. • List the different heuristic search algorithms • Know the A* algorithm search strategy • Define Admissibility – Monotonicity – and Informedness • Know the min-max game playing algorithm • Show the game strategy for three players game. • Demonstrate the alpha beta pruning algorithm. • list the different knowledge representations. • Define the production rules • Define what an expert system is. • Define what propositional logic is • List the advantages and disadvantages of propositional logic • Define what first order logic is. • List the advantages and disadvantages of the first order logic • show the resolution in FOL • define the soundness and completeness in FOL
b- Intellectual Skills	<p>Through intellectual skills, students will be able to:</p> <p>b1. Select/Apply appropriate mathematical and computer-based methods for modeling and analyzing problems and select appropriate solutions for engineering problems based on analytical thinking.</p> <ul style="list-style-type: none"> • Solve some example problems using state space • Show the state space generated nodes using different blind search algorithms

	<ul style="list-style-type: none"> • 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 <p>b3. Combine, exchange, and assess different ideas, views, and knowledge from a range of sources.</p> <ul style="list-style-type: none"> • 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.
c- Professional Skills	<p>Through professional and practical skills, students will be able to:</p> <p>c4. Apply numerical modeling methods to engineering problems.</p> <ul style="list-style-type: none"> • Differentiate between depth and breadth search • Compare the search space between blind and heuristic search • Analyze the effect of the pruning algorithm <p>c9. Write computer programs on professional levels achieving acceptable quality measures in software development. Conduct user support activities competently.</p> <ul style="list-style-type: none"> • Compare the results to results of the min-max algorithm
d- General Skills	<p>Through general and transferable skills, students will be able to:</p> <p>d3. Demonstrate efficient IT capabilities.</p> <p>d4. Search for information and engage in life-long self-learning computer engineering and refer to relevant literatures.</p> <ul style="list-style-type: none"> • Acquire analysis and presentation skills.

4- Course Content

Week No.1	Introduction to AI : Definition - History – Goals
Week No.2	AI as Representation and Search. State Space. Search Strategy.
Week No.3	Blind search techniques.
Week No.4	Informed (Heuristic) search techniques : Hill Climbing – Best First
Week No.5	A* Algorithm
Week No.6	Admissibility – Monotonicity – Informedness of a heuristic function
Week No.7	7th Week Exam +Revision
Week No.8	Game trees
Week No.9	Alpha Beta Pruning Algorithm
Week No.10	Knowledge Representation
Week No.11	Expert systems & knowledge-based systems.
Week No.12	12th Week Exam + Revision.
Week No.13	Propositional Logic : Syntax – Semantic – Proof by resolution refutation.
Week No.14	First Order Logic : Syntax – Semantic –
Week No.15	First Order Logic : Resolution - Soundness – Completeness
Week No.16	Presentation of projects and Final Exam.

5- Teaching and Learning Methods

- Lectures
- Tutorials
- Reports & sheets
- Laboratories
- Seminars

6-Teaching and Learning Methods for Students with Special Needs

- Lectures
- Tutorials
- Reports & sheets
- Laboratories
- Seminars

The academic advisors of each student, as well as dedicated department TAs monitor the students' progress and solve any problem he/she may encounter.

7- Student Assessment

a-Procedures used	1-Written Examinations to assess The Intended Learning Outcomes.	
	2-Class Activities (Reports, Discussions, -----) to assess The Intellectual Skills.	
b- Schedule:	Assessment 1	7 th Week Written Exam
	Assessment 2	12 th Week Written Exam
	Assessment 3	Continuous
	Assessment 4	16 th Week Final Written Exam
c- Weighing of Assessment	7 th Week Examination	30 %
	12 th Week Examination	20 %
	Final-term Examination	40 %
	Oral Examination	00 %
	Practical Examination	00 %
	Semester Work	10 %
	Total	100%

8- List of References:

a- Course Notes	
b- Required Books (Textbooks)	<ul style="list-style-type: none"> • Stuart Russell and Peter Norvig, <i>Artificial Intelligence: A modern Approach</i>, Prentice-Hall, 2nd edition, 2003.
c- Recommended Books	<ul style="list-style-type: none"> • Elaine Rich, Kevin Knight, <i>Artificial intelligence</i>, McGrawHill Inc, 1995 • Peter Jackson, <i>Introduction to Expert Systems</i>, Addison Wesley, 3rd edition, 1999. • Ivan Bratko, <i>Prolog programming for AI</i>, Addison Wesley, 3rd edition, 2000.
d- Periodicals, Web Sites, etc.	

Course Instructor:
Assoc. Prof. Dr. Sherin Youssef

Head of Department:
Prof. Dr. Mohamad AbouEI-Nasr

Dean of College of Engineering and Technology of AASTMT

Executive Manager of Quality Assurance Center of AASTMT

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Signature:

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