UNIVERSITY of NICOSIA

Course Syllabus

Course Code COMP-405	**Course Title** Artificial Intelligence	**ECTS Credits** 6
Prerequisites COMP-211	**Department** Computer Science	**Semester** Fall
Type of Course Required	**Field** Computer Science	**Language of Instruction** English
Level of Course 1st Cycle	**Lecturer(s)** Prof. Athena Stassopoulou	**Year of Study** 4th
Mode of Delivery Face to Face	**Work Placement** N/A	**Corequisites** None

Course Objectives:

The main objectives of the course are to provide an introduction to the theory and practice of Artificial Intelligence. It is designed to develop an understanding of the fundamental issues associated with the field such as: problems and search, knowledge representation and reasoning, game playing, rule-based systems. Advanced topic areas such as probabilistic reasoning and Bayesian networks are also introduced.

Learning Outcomes:

After completion of the course students are expected to be able to:

1. define problems in terms of a formal representation
2. analyze problems based in their characteristics
3. examine various search techniques (both uniformed and informed) and apply them to solve problems
4. develop suitable heuristic functions for informed search
5. implement a solution to a problem using searching
6. explain the role of Knowledge Representation in Artificial Intelligence
7. use predicate logic to translate and prove sentences

8. explain the fundamentals of rule-based systems
9. examine the various approaches to uncertain reasoning and apply them to problems explain the fundamentals of game playing (both deterministic and stochastic games) and apply the suitable algorithms for searching and pruning game trees

Course Content:

1. Overview of Artificial Intelligence: Definitions, Turing Test, History of AI, state-of-the-art, AI research areas
2. Problems and Search: Defining a problem, state space representation, state space search, problem characteristics, uninformed search.
3. Informed Search: Heuristic searching, heuristic functions, hill-climbing search, best-first search, greedy search, A* search, admissible heuristics.
4. Knowledge representation issues: Knowledge Representation, Knowledge Bases, representations and mappings, requirements of a Knowledge Representation Language.
5. Logic: Propositional Logic, Inference rules, First-Order (predicate) Logic, inference in First-Order Logic.
6. Representing knowledge using rules: Rule-based system architecture, recognize-act cycle, forward and backward chaining.
7. Uncertain reasoning: Uncertainty, Probabilities and Baye's rule, Certainty Factor Theory, Bayesian Networks, Dempster-Shafer Theory.
8. Game Playing: game playing as search (deterministic, 2-player games), minimax algorithm, Alpha-beta pruning, searching a game tree for non-deterministic games, expectiminimax.

Learning Activities and Teaching Methods:

Lectures, Practical Exercises and Assignments

Assessment Methods:

Mid-term exam, Projects, Assignments, Final Exam.

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Artificial Intelligence: A Modern Approach (3rd ed)	S. Russell and P. Norvig	Prentice Hall	2010	0132071487

Recommended Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Artificial Intelligence: Structures and Strategies for Complex Problem Solving (6th Edition)	G. F. Luger	Addison Wesley	2008	0321545893
Artificial Intelligence: A New Synthesis	Nils J. Nilsson	Morgan Kaufmann Publishers, Inc.	1998	1558604677