



University of Nicosia, Cyprus

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

Objectives of the Course:

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
10. explain the fundamentals of game playing (both deterministic and stochastic games) and apply the suitable algorithms for searching and pruning game trees

Course Contents:

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.
 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:

Homework, Projects, Midterm Exam, Final Exam.

Required Textbooks/Reading:

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

Recommended Textbooks/Reading:

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