

SYLLABUS

CS 481 – INTRODUCTION TO ARTIFICIAL INTELLIGENCE **(REQUIRED)** (INTRODUCTION A L'INTELLIGENCE ARTIFICIELLE)

Course Catalog Description

This is an introductory course to artificial intelligence that covers fundamental topics in AI, specifically search, reasoning, knowledge representation, planning, and machine learning. The course provides students with a general overview of the artificial intelligence field. Key topics include the concept of intelligent agents and their capacity to perform tasks such as search, problem solving, symbolic and probabilistic reasoning, planning, and machine learning. Students will learn foundational AI concepts and algorithms and apply them to create systems that interact intelligently within complex environments.

Course Requirements

- **Pre-requisites:** MATH 112 (Linear Algebra). MATH 270 (Probability & Statistics). CS 121 (Programming I – Python). CS 141 (Data structures and Algorithms).
- **Co-requisites:** None.
- **Credit Hours:** 5 ECTS/TN (3 US)
- **Program Outcomes** (« Compétences Programme ») : 3, 5, 10, 21, 35, 47.
- **ABET Student Outcomes:** 1, 2.

References

- **Textbook:**
 - **Required:** S. Russell and P. Norvig. *Artificial Intelligence: A Modern Approach*, Fourth/Global Edition. Pearson, 2021.
- **Others:**
 - Online guided course on MUST's learning platform.
 - Assigned readings of seminal research papers.

Instructor/Course Coordinator

Instructor:

Office:

Course coordinator:

Email:

Office Hours:

Teaching Assistant:

Grading Policy

Assessment	Week	Weight
Midterm		30%
Quizzes		10 %
Programming assignments		20%
Final		40%

Course Learning Outcomes (CLOs)

<i>No.</i>	<i>CLOs</i>	<i>Assessment Methods</i>	<i>SOs</i>
CLO1.	Identify problems where artificial intelligence techniques are applicable.		1
CLO2.	Demonstrate an understanding of basic AI techniques and their fields of application.		1
CLO3.	Apply selected basic AI techniques in problems in science and engineering and judge the applicability of more advanced techniques.		2
CLO4.	Participate in the design of systems that act intelligently and learn from experience.		2
CLO5.	Apply learning algorithms to a real problem, optimize the models learned and evaluate them.		2, 6
CLO6.	Design and evaluate machine learning algorithms.		2, 6

Course Topics

Topics	Chapter	Weeks
Introduction. Course overview. Introduction to Artificial Intelligence.		1
Intelligent Agents. Agents and environments, rationality, the structure of agents.		2
Search. Problem spaces and search. Knowledge and rationality Heuristic search strategies. Adversarial search.		3
Constraint satisfaction.		4
Knowledge, reasoning, and planning. Logical agents. Propositional logic.		5
Knowledge, reasoning, and planning. First-order logic. Inference in First-order logic.		6
Knowledge, reasoning, and planning. Knowledge representation. Automated planning.		7
Review. Midterm exam.		8
Reasoning under uncertainty.		9

Uncertainty. Bayesian reasoning. Hidden Markov Models.		
Machine learning: Supervised methods. Regression. Classification.		10
Machine learning: unsupervised, reinforcement, and semi-supervised learning Dimensionality reduction: PCA. Clustering – k-means, hierarchical clustering Reinforcement learning. Semi-supervised learning.		11-12
Deep Learning: Neural networks and back-propagation. Convolutional neural networks.		13
AI Ethics.		14
Final review.		15

Student Outcomes (SOs)

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Approvals

Prepared by: ____

Signature:

Date:

Approved by the Dept.:

Signature:

Date: