Artificial Intelligence

- 1. Course number and name: 020IA2ES4 Artificial Intelligence
- 2. Credits and contact hours: 4 ECTS credits, 2x1:15 contact hours
- 3. Name(s) of instructor(s) or course coordinator(s): Youssef Bakouny
- 4. Instructional materials: PowerPoint slides; Moodle Ressources; Group Assignments

References:

- Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, 4th Edition, 2020.
- Hands-on Machine Learning with Scikit-Learn, Keras & TensorFlow, Third Edition. Aurélie Géron. O'Reilly, 2022.

5. Specific course information

a. Catalog description:

This course aims to study artificially intelligent agents. It portrays several methods of implementing these agents: from simple reflex agents to utility-based agents as well as learning agents. We first cover greedy and A* search, the implementation of games through the Minimax and Expectimax algorithms, Markov Decision Processes (MDP) and Reinforcement Learning (RL). We then introduce Machine Learning (ML) algorithms with some applications.

- b. Prerequisites: None
- **c. Required** for CCE Software Engineering students; **Selected Elective** for CCE Telecommunication Networks students and EE students

6. Educational objectives for the course

- a. Specific outcomes of instruction:
 - Understand and implement artificially intelligent agents.
 - Understand, implement and evaluate search problems and heuristics.
 - Understand, implement and evaluate adversarial search algorithms.
 - Understand Markov Decision Processes (MDP)
 - Understand, implement and evaluate Reinforcement Learning (RL) algorithms.
 - Understand and apply Machine Learning (ML) algorithms.

b. PI addressed by the course:

PI	1.2	1.3	2.4	2.5	3.2	4.1	4.2	6.3	6.4	7.1
Covered	Х	Х	Х			X	X	Х	X	X
Assessed	X	X	Х	х	X			X	X	

7. Brief list of topics to be covered

- Intelligent agents (2 lectures)
- Greedy and A* search (2 lectures)
- Heuristics functions (1 lecture)
- Games and adversarial search (1 lecture)
- The Minimax algorithm (2 lectures)
- The Expectimax algorithm (2 lectures)
- Multiplayer games and Utilities (1 lecture)
- Monte Carlo Tree Search (1 lecture)
- Markov Decision Processes (MDP) (4 lectures)
- Reinforcement Learning (4 lectures)
- Machine Learning and Applications (4 lectures)