Artificial Intelligence

1. **Course number and name:** 020IA3ES4 Artificial Intelligence

2. **Credits and contact hours:** 4 ECTS credits, 2x1:15 contact hours per week

3. **Name(s) of instructor(s) or course coordinator(s):** Youssef Bakouny

4. **Instructional materials:** PowerPoint slides; Moodle Ressources; Assignments.

   Textbooks/References:
   - Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, 4th Edition, 2020.
   - Hands-on Machine Learning with Scikit-Learn, Keras & TensorFlow, 3rd 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. The course first covers greedy and A* search as well as the implementation of games through the minimax and expectimax algorithms. Then, it introduces some basic supervised Machine Learning algorithms such as regression and classification. Finally, these algorithms are applied to realistic datasets via Python implementations using libraries such as Scikit-learn, Tensorflow and Keras.

   b. **Prerequisite:** None.

   c. **Selected Elective** for ME students.

6. **Educational objectives for the course**
   a. **Specific outcomes of instruction:**
   By the end of the course, the students will be able to:
   - Understand and implement artificially intelligent agents.
   - Understand, implement and evaluate search problems and heuristics.
   - Understand, implement and evaluate adversarial search algorithms.
   - Understand, implement and evaluate regression and classification Machine Learning (ML) algorithms using both traditional and deep learning-based methods.

   b. **PI addressed by the course:**

PI	1.2	1.3	2.4	2.5	4.1	4.2	5.1	6.1	6.2	6.3	6.4	7.1	7.2
Covered	x	x	x	x	x	x		x	x	x	x	x	x
Assessed	x	x	x	x			x	x	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).
- Introduction to Machine Learning (2 Lectures).
- Traditional Regression Supervised Learning Solutions (2 Lectures).
- Traditional Classification Supervised Learning Solutions (2 Lectures).
- Introduction to Deep Learning (2 Lectures).
- Regression and Classification using MLP Neural Networks (2 Lectures).
- Machine Learning Project Defense (2 Lectures).