Short course:

**An introduction to reinforcement learning**

Professor: **Dr. Ernesto Martínez**

Duration: **8 hours in four 2-hours lectures.**

Contents

**Lecture 1** - *Reinforcement Learning (RL) fundamentals.*
The RL problem; Examples. Evaluative feedback; Evaluation vs. instruction; Goals and rewards, Markov decision processes; Value functions and control policies. The role of exploration. Stochastic policies.

**Lecture 2** - *Solving the RL problem*
Monte Carlo methods; Temporal-Difference learning; On and off-policy learning; Q-learning; Actor-Critic methods; eligibility traces.

**Lecture 3** - *Function approximation*
Continuous states; Value function prediction; Gradient-descent methods; linear methods; Continuous states and actions; Neural Q-learning; Supervised reinforcement learning.

**Lecture 4** - *Real-world applications*
Robotics; Ship steering and autonomous underwater vehicles; Process supervision; Controller performance monitoring; Intelligent MPC.

**Main Literature**


**Final Project**: The course attendees are evaluated by successfully completing a pilot project implementation of reinforcement learning to a case study.