Learning objectives

After completing this course, participants will be able to:

- Link some field problems to their formal Machine Learning counterparts;
- Know the main bottlenecks and challenges of data-driven approaches;
- Decide which method is relevant to solve a sequential decision problem;
- Know the foundations of RL, path planning, scheduling and decentralized decision methods.

Prerequisites

- General knowledge on computer science, mathematics, and algorithmic.
- The Python programming language will be used throughout the course (numpy and pandas libraries).
Course Content

AIBT106 - Machine learning and data analytics (28h):
- The data analytics workflow;
- General overview of Machine Learning;
- Unsupervised Learning;
- Geometrical & probabilistic approaches in Supervised Learning;
- Bio-inspired ML, Neural Networks and Deep Learning;
- Feature engineering and data preprocessing;

AIBT108 - Sequential Decision Making in AI (28h):
- Reinforcement Learning (RL);
- Scheduling and different optimization methods and modeling frameworks;
- Shortest path algorithms, heuristic search, motion planning;
- Decentralized decision making;
- Multi-agent concepts and game theory. Collaborative and adversarial decision making.

AIBT110 - AI certification, robustness and dependability
- When Learning algorithms face the questions of robustness, interpretability and explainability, certificability: examples of successes and failures;
- Presentation of ongoing reflections on the evolution of norms, especially in the aerospace and automotive industries;
- The human/machine couple in the decision process;
- Are we ready to accept a reduced performance?
### Teaching methods

<table>
<thead>
<tr>
<th>Teaching methods</th>
<th>Yes</th>
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<tbody>
<tr>
<td>Lectures / tutorial</td>
<td>X</td>
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<tr>
<td>Collaborative learning</td>
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<td>Flipped classroom</td>
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<td>Blended learning (online and face to face)</td>
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<td>Learning by doing</td>
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<td>Project-based</td>
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<td>Simulation</td>
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<td>Case study</td>
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### Assessment

Written examination (100%)