**Intelligent agents**

**Faltings Boi**

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### Cursus

<table>
<thead>
<tr>
<th>Cursus</th>
<th>Sem.</th>
<th>Type</th>
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<tr>
<td>Computer science minor</td>
<td>H</td>
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<tr>
<td>Computer science</td>
<td>MA1, MA3</td>
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<td>MA1, MA3</td>
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<td>Learning Sciences</td>
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<td>Robotics, Control and Intelligent Systems</td>
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<td>Robotics</td>
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<td>SC master EPFL</td>
<td>MA1, MA3</td>
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### Summary

Software agents are widely used to control physical, economic and financial processes. The course presents practical methods for implementing software agents and multi-agent systems, supported by programming exercises, and the theoretical underpinnings including computational game theory.

### Content

The course contains 4 main subject areas:

1) Basic models and algorithms for individual agents:
Models and algorithms for rational, goal-oriented behavior in agents: reactive agents, reinforcement learning, exploration-exploitation tradeoff, AI planning methods.

2) Multi-agent systems:
multi-agent planning, coordination techniques for multi-agent systems, distributed algorithms for constraint satisfaction.

3) Self-interested agents:
Models and algorithms for implementing self-interested agents motivated by economic principles: elements of computational game theory, models and algorithms for automated negotiation, social choice, mechanism design, electronic auctions and marketplaces.

4) Implementing multi-agent systems:
Agent platforms, ontologies and markup languages, web services and standards for their definition and indexing.

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### Learning Prerequisites

**Recommended courses**

Intelligence Artificielle or another introductory course to AI

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### Learning Outcomes

By the end of the course, the student must be able to:

- Choose and implement methods for rational decision making in software agents, based on decision processes and AI planning techniques
- Choose and implement methods for efficient rational decision making in teams of multiple software agents
- Model scenarios with multiple self-interested agents in the language of game theory
- Evaluate the feasibility of achieving goals with self-interested agents using game theory
• Design, choose and implement mechanisms for self-interested agents using game theory
• Implement systems of software agents using agent platforms

Teaching methods
Ex cathedra, practical programming exercises

Expected student activities
Lectures: 3 hours
Reading: 3 hours
Assignments/programming: 4 hours

Assessment methods
Midterm and quizzes 30%, final exam 70%

Resources
Bibliography

Ressources en bibliothèque
• An Introduction to MultiAgent Systems / Wooldridge
• Artificial Intelligence: A Modern Approach / Russell

Moodle Link
• https://go.epfl.ch/CS-430