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.

Learning Prerequisites
Recommended courses
Intelligence Artificielle or another introductory course to AI

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
Mini-projects and exercises 40%, final exam 60%

Resources
Bibliography

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

Websites
• http://liawww.epfl.ch/
• http://moodle.epfl.ch/