Computer Science (COMP) 667

Multiagent Systems (Revision 5)

Status:	Replaced with new revision, see the **course listing** for the current revision
Delivery mode:	**Individualized study online**. Delivered via Brightspace.
Credits:	3
Area of study:	Information Systems
Prerequisites:	This course is written for a graduate or advanced undergraduate student. You should be comfortable with mathematical notation and basic computer algorithms (e.g., **COMP 272** or **COMP 504**). If you are concerned about not meeting the prerequisite for this course, contact the course instructor before registering.

Precluded:	None
Faculty:	**Faculty of Science and Technology**
Notes:	This is a graduate level course, and you must apply and be approved to one of the graduate programs or as a non-program **School of Computing and Information Systems** graduate student in order to take this course. The minimum admission requirements must be met. Undergraduate students who do not meet admission requirements will not normally be permitted to take this course.
Instructor:	**Dr. Fuhua (Oscar) Lin**

Overview

Multiagent systems (MAS) can be defined as loosely coupled networks of problem solvers that interact to solve problems that are beyond the individual capabilities or knowledge of each problem solver. These problem solvers, often called agents, are autonomous and can be heterogeneous in nature.

Research and development in multiagent systems is concerned with the study, behaviour, and construction of a collection of autonomous agents that interact with each other and their

environments. The study of such systems goes beyond the study of individual intelligence in its consideration of problem solving with social components.

Computer Science 667: Multiagent Systems introduces you to the main topics in the theory and practice of multiagent systems—currently one of the most important and rapidly expanding areas of computer science, having emerged from the study of distributed artificial intelligence (DAI). Multiagent systems have been used as an important means with which to address the development of large and complex information systems (IS) and decision support systems (DSS).

Because game theory is a key tool to master within the field, this course first introduces you to the concepts in noncooperative game theory, covering the normal form and the extensive form. You will then learn about multiagent learning; social-choice theory, including voting methods; preference aggregation; mechanism design, which looks at how preferences can be aggregated by a central designer even when agents are strategic; and protocols for multiagent resource allocation (auctions). Finally, this course introduces coalitional game theory and its potential applications.

Outline

- Unit 1: Foundations
- Unit 2: Intelligent Agents and Multiagent Systems
- Unit 3: Multiagent Learning
- Unit 4: Social Choice
- Unit 5: Mechanism Design
- Unit 6: Multiagent Resource Allocation
- Unit 7: Coalitional Games

Learning outcomes

Upon successful completion of this course, you should be able to

- explain and demonstrate the basic concepts of agent-based approach, noncooperative game theory, multiagent learning, social choice, mechanism design, auctions, and cooperative game theory.
- develop business and real-world perspectives of multiagent systems.
- use software tools to develop and test multiagent systems.
- recognize key advancements in MAS technologies, such as multiagent reinforcement learning.
- evaluate the potential of multiagent systems in solving complex problems in fields like robotics, healthcare, finance, and supply chain management.

Evaluation

To **receive credit** for COMP 667, you must achieve a course composite grade of at least **B– (70 percent)**, an average grade of at least 60 percent on the assignments, and a grade of at least 60 percent on the project.

The weighting of the composite grade is as follows:

Activity	Weight
Assignment 1	20%

Activity	Weight
Assignment 2	20%
Assignment 3	20%
Final project and presentation	30%
Participation	10%
Total	**100%**

Materials

Digital course materials

Links to the following course materials will be made available in the course:

Shoham, Y., & Leyton-Brown, K. (2010). *Multiagent systems: Algorithmic, game-theoretic, and logical foundations* (Rev. 1.1). https://www.masfoundations.org/download.html

Important links

- **Future Course Offerings**

- **Important Dates and Deadlines**
- **MSc CIS Contact Information**

Athabasca University reserves the right to amend course outlines occasionally and without notice. Courses offered by other delivery modes may vary from their individualized study counterparts.

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View **previous revision**