COMP 4116/5900G for Fall 2026

Multiagent Systems

Course Outline

Course Information

Instructor: Alan Tsang (https://people.scs.carleton.ca/~alantsang/)
Contact: Alan.Tsang@carleton.ca
Course Website: https://brightspace.carleton.ca
Lectures: **1435 – 1555 (Tue, Thu)** in-person (see Carleton Central or Brightspace)
Office Hours: **1605 – 1645 (Tue)** in-person at HP 5411

Alternative hours: 1300 – 1345 (Thu) but they are prioritized for another course. You may book additional appointments (including Zoom meetings) via email. Online messages during this hour will be replied to promptly.

Required Tools: Ability to run Python
Last Revised: Sep 8, 2026

Teaching Assistants

Contact info for your TA will be posted on Brightspace once the course starts.

Full Course Description

Multiagent systems is a branch of artificial intelligence that explores the interactions between multiple rational entities, where each may have access to different information and possibly conflicting priorities. This course takes an approach founded on economic game theory. We will examine how coordination and cooperation can emerge, and how to design systems to achieve global goals despite a lack of cooperation from individual entities. Students should be comfortable with rigorous mathematics and formal proofs. Assignments will also require basic Python programming skills
Prerequisites: COMP 3106

Course Objectives

This course surveys a number of topics in the area of multiagent systems. Students will gain a robust understanding of algorithmic game theory, which can be used as stylized models of scenarios in the real world. Using game theory, they will be able to capture a scenario's decision points (strategies), represent agents and their desires (preferences) mathematically, and compute plausible outcomes to those scenarios (equilibria). Students will then examine

several types of well studied scenarios in detail, including voting (social choice theory, auctions (auction theory), and the fair division of resources (mechanism design).

Textbooks (Optional)

Primary Textbook

- Y. Shoham, K. Leyton-Brown, Multiagent Systems: Algorithmic Game-Theoretic, and Logical Foundations, Cambridge University Press, 2009.

Other Useful References

- N. Nisan, T. Roughgarden, E. Tardos, and V. Vazirani (Eds.), Algorithmic Game Theory, Cambridge University Press, 2007.
- M. Osborne and A. Rubinstein, A Course in Game Theory, MIT Press, 1994.

Course Format and Assessments

The course has **two in-person classes every week**. You are expected to attend as lectures **will not be recorded**. If you miss a lecture, it will be your responsibility to catch up on missed materials.

The assessments in the course will be based on a combination of individual assignments and a final project. The final project will the form of a conference paper, which may survey existing works or contain original research. Students will also present their paper (or their work-in-progress) to the class at the end of the term. Graduate students will complete the project solo, while undergraduates enrolled in the COMP 4900 section will work in groups of 2.

Inquiries

If you have a question (ex: clarification on readings, discussion about something said during class, questions about assignments), you should **post them online** so your classmates can benefit from the discussion. If the question is about your assessments or situation, you may email the instructor or leave a message on Discord.

Please **add COMP 5900G or 4116 in your email subjects** to ensure they are prioritized. Do not post code or assignment answers in the open or in course discussions. Questions about assessments **will not be answered within 24 hours** of the due date.

You may also schedule an appointment by emailing the instructor or assigned TA.

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Multiagent Systems

Topics Covered

1	Game Theory and Game Forms
2	Computation of game theoretic solution concepts
3	Bounded rationality
4	Social choice
5	Mechanism design
6	Auctions (single item, combinatorial, sponsored search)
7	Fair division of resources
8	Teams and coalitions
9	Multiagent learning
10	Applications of multiagent systems

Other important dates and deadlines from the university can be found here.

There will be an experiential learning activity outside of class (likely on a weekend day) toward the end of November where students will form teams that compete and cooperate with each other. The activity will take place in-person and on campus. An alternative independent study activity is also available, though students are encouraged to participate in the group activity. More information will be released as we approach November.

Assessment Scheme

40%*	Final Project (due during Exam Period)
25%*	Presentation
35%	Assignments

* Undergrads in COMP 4900 are to complete the project in groups of 2

Late Policy

All assignments and the final project may be submitted up to 48 hours late, with **no late penalty**. Presentations must be done in the designated timeslot.

This policy accommodates unexpected circumstances such as technical and personal issues; therefore, no additional extensions will be granted (excepting accommodations provided by university policy). Submissions are handled electronically via Brightspace, which includes

provisions for the extended deadline. Assignments will not be accepted after this extended deadline.

Generative AI Tools

You are discouraged from relying on generative AI tools such as chatbots (e.g., ChatGPT, Google Gemini, Microsoft Co-pilot) and research assistants (e.g., Elicit) as they frequently produce incorrect information with exaggerated confidence and undermine learning. As such, they should never be referenced as an authoritative source.

Appropriate use includes as an advanced web search for identifying relevant literature, for code generation for routine coding tasks (such as generation of templates or format conversions), translating text into other languages for comprehension, and for basic rephrasing or writing clean-up. You **may not use them for the overall design** of your assignment solutions. The coding component of this course is relatively simple and these tools should not be necessary. And note that you are responsible for everything you submit for evaluation. You are responsible for any errors or offenses committed by any AI tool you use.

If you have used generative AI tools, you should include text declare their use (either in the submission document, or in the textbook accompanying the submission). Improper citations of this sort may constitute an academic integrity offense, and will be reported to the office of the Dean of Science. An exception is made for automatic grammar and punctuation checking tools (such as Grammarly), which may be used without citation.

Smart Glasses

Oral presentations and evaluations are considered examination environments and therefore should be carried out without unauthorized electronic aid. Use of Smart Glasses (or other assistive technology that provide real time AI feedback on recorded data) during oral presentations and evaluations is strictly prohibited and is considered an academic integrity violation. Even if you have prescription glasses with assistive technologies, you will not be allowed to use them during these periods, so please ensure you have acceptable prescription glasses. The instructor or TA has the right to ask to inspect your glasses before or during the presentation. In addition, unless authorized with PMC accommodations, you are NOT allowed to use headphones nor ear buds during these times.

Writing and Academic Integrity

This course includes significant written and oral evaluation components. This may be the first time you have written long form prose in some time. Nonetheless, clear and concise written communication is a valuable skill for computer scientists. All written and oral communications should be **in your own words** (with several clearly marked and referenced quotations).

Marks will be deducted for grammar, spelling, and punctuation errors, and other mangled misuse of language. You are expected to follow academic integrity guidelines, particularly the section on plagiarism. Plagiarism is often *very obvious* to the grader. Don't do it!

Other academic boilerplate:
If you are unsure of the expectations regarding academic integrity (how to use and cite references, how much collaboration with lab- or classmates is appropriate), ASK your instructor. Sharing assignment or quiz specifications or posting them online (to sites like Chegg, CourseHero, OneClass, etc.) is considered academic misconduct. You are never permitted to post, share, or upload course materials without explicit permission from your instructor. Academic integrity offences are reported to the office of the Dean of Science. Penalties for such offences can be found on the ODS webpage: https://science.carleton.ca/academic-integrity/.

Graduate Students

- The following policies distinguish the graduate version from the undergraduate version of this course:
  - Graduate students complete their projects solo
  - Graduate projects and presentations are judged according to a level of completion and quality suitable for submission / presentation to a workshop of appropriate domain
- Brightspace access for University of Ottawa Students; please see information here: https://gradstudents.carleton.ca/faculty-of-graduate-and-postdoctoral-affairs-access-to-brightspace/
- University of Ottawa Students who need access to SCS IT resources such, as OpenStack and Nextcloud, must submit a request to SCS Tech Support SCS.Tech.Support@cunet.carleton.ca. The request must be sent from their @cmail.carleton.ca email address and the email should say which resource is required and for which course (including section).

Undergraduate Academic Advisors

The Undergraduate Advisors for the School of Computer Science are available in Room 5302HP; or by email at scs.ug.advisor@cunet.carleton.ca. The undergraduate advisors can assist with information about prerequisites and preclusions, course substitutions/equivalencies, understanding your academic audit and the remaining requirements for graduation. The undergraduate advisors will also refer students to appropriate resources such as the Science Student Success Centre, Learning Support Services and Writing Tutorial Services.

Graduate Academic Advisors

The Graduate Advisors for the School of Computer Science are available in Room 5302 HP; or by email at grad.scs@carleton.ca. The graduate advisors can assist with understanding your academic audit and the remaining courses required to meet graduation requirements.

SCS Computer Laboratory

Students taking a COMP course can access the SCS computer labs. The lab schedule and location can be found at: https://carleton.ca/scs/tech-support/computer-laboratories/. All SCS computer lab and technical support information can be found at: https://carleton.ca/scs/tech-support/. Technical support staff may be contacted in-person or virtually, see this page for details: https://carleton.ca/scs/tech-support/contact-it-support/.

University Policies

Academic Accommodations

Carleton is committed to providing academic accessibility for all individuals. Please review the academic accommodation available to students here: https://students.carleton.ca/course-outline/.

Academic Integrity

Student Academic Integrity Policy. Every student should be familiar with the Carleton University Student Academic Integrity policy. A student found in violation of academic integrity standards may be sanctioned with penalties which range from a reprimand to receiving a grade of F in the course, or even being suspended or expelled from the University. Examples of punishable offences include plagiarism and unauthorized collaboration. Any such reported offences will be reviewed by the office of the Dean of Science. Students are expected to familiarize themselves with and abide by Carleton University's Academic Integrity Policy. Claiming ignorance of or confusion about the academic integrity standards as described in the Policy does not excuse a student from responsibility for violations of those standards. More information on this policy may be found on the ODS Academic Integrity page: Academic Integrity | Faculty of Science (carleton.ca).

Plagiarism. As defined by Senate, "plagiarism is presenting, whether intentional or not, the ideas, expression of ideas or work of others as one's own". Such reported offences will be reviewed by the office of the Dean of Science. More information and standard sanction guidelines can be found here: https://science.carleton.ca/students/academic-integrity/. Please note that content generated by an unauthorized A.I.-based tool *is* considered plagiarized material.

Unauthorized Collaboration. Senate policy states that "to ensure fairness and equity in assessment of term work, students shall not co-operate or collaborate in the completion of an academic assignment, in whole or in part, when the instructor has indicated that the assignment is to be completed on an individual basis".