

AI 610: Agent Based Systems

School of Technology & Computing

3 Credits, Graduate Course
Grading Type: Decimal
Summer 2023

Access to the Internet is required.

All written assignments must be in Microsoft-Word-compatible formats.

See the library's APA Style Guide tutorial for a list of resources that can help you use APA style.

Faculty Information

Professional experience information for instructors is found under *Faculty Information* in the online course menu.

Contact Information

Contact information for instructors is found under *Faculty Information* in the online course menu.

Email: [first name] [last name]

Phone: [xxx-xxx-xxxx]

Office Hours and Response Time: [I am available through MS Teams <day> and <day> between <xx>-<xx> pm PTS. I will respond within 24 hours. I will grade within 3 business days after the due date.]

Bio: (keep images under 300px wide)

Course Description

This course provides students with a comprehensive introduction to agents and multi-agent systems. Topics include agent architectures, distributed AI and agents, intelligent agents, multi-agent systems, agent interaction, communication, and distributed decision-making models. Students evaluate current trends in intelligent agents and their use cases in business and industry and non-profit organizations. Students illustrate their knowledge designing a real-world application developed in a cloud-based framework SDK.

Course Resources

Required and recommended resources to complete coursework and assignments are found on the course Reading List. The reading list can be found under Course Information in Desires to Learn LMS, as well as from the library homepage.

Note: Required resources that must be purchased by the student are tagged “Purchase from a vendor of your choosing.” Required resources with a direct link, “Available through CityU Library”, are available at no cost to students.

Students in Canada will see required resources they need to purchase tagged “Purchase from the Canadian Bookstore.” Students outside the U.S. and Canada should contact their advisor or textbook coordinator for additional information.

Course Outcomes

At the end of this course, students:

1. Explain basic concepts of agents and intelligent agent systems both from theoretical and practical point of view.
2. Identify basic methodologies of single and multi-agent intelligent systems.

3. Apply principles and methods of intelligent agents to a small-scale practical problem.
4. Analyze methods, techniques, and tools for the use of intelligent agent-based systems.
5. Evaluate current trends in intelligent agents and their use cases in business and industry and non-profit organizations.
6. Design and implement an application of an agent-based system using cloud AI framework and services.

Grading Scale

The grades earned for the course will be calculated using City University of Seattle's decimal grading system, found in the current University Catalog (<https://www.cityu.edu/catalog/>).

Grading rubrics with details on how each assignment will be graded are located under *Assignments* and/or in *My Grades* in the online course menu. Students should review each assignment's rubric before completing their work to understand how it will be assessed.

OVERVIEW OF REQUIRED ASSIGNMENTS	% OF FINAL GRADE	POINTS
<i>Instructor Determined Assignments</i>	30%	
The Muddiest Point (MP)	5%	50 = 5 points * 10 modules
Concept Test (CT)	5%	50 = 5 points * 10 modules
Discussion Board (DB)	10%	100 = 10 points * 10 modules
Knowledge Check (KC)	10%	100 = 10 points * 10 modules
<i>Major Assignments</i>	70%	
Hands-On Skills (HOS)	20%	200 = 20 points * 10 modules
Virtual Labs (VL)	30%	300 = 30 points * 10 modules
Team Project (TP)	20%	Proposal: 30 points Progress: 70 points Final Report: 70 points Final PPT: 30 points Subtotal: 200 points
TOTAL	100%	1,000 points

Course Assignments and Grading

The instructor will provide grading rubrics that will explain how this assignment will be graded.

The Muddiest Point (MP)

This activity ensures students engage in the course and understand basic concepts of intelligent agents both from theoretical and practical point of view. The instructor uses the MP to assess how students understand the required readings. Students submit the Muddiest Point (MP) activity before class (or by Wed if class is fully online). The instructor also uses the MP to

customize the lecture scope to implement Just-in-Time Teaching (JiTT). The MP consists of writing a brief reflective essay (<= 50 words) identifying the most confusing part (i.e., the MP) of the content covered in the upcoming module. If a student understands all concepts, the student needs to explain the most exciting aspect. There is one multiple-choice question from the required reading to demonstrate that the student understands the required readings.

<i>MP Criteria</i>	<i>% of Grade</i>
Participation	80%
Correctness	20%
TOTAL	100%

Concept Test (CT)

The concept test reinforces what is learned in lectures and readings. Students reflect on concepts and methodologies of single and multi-agent systems and explain their uses in organizations. The instructor presents specific problems; after reflecting on the problem, students submit their responses. The instructor provides feedback. Students discuss their thought process and solution with a peer utilizing the discussion board. Instructor reviews the responses and provides feedback.

<i>CT Criteria</i>	<i>% of Grade</i>
Engagement	100%
TOTAL	100%

Discussion Board (DB)

Each week the instructor posts a topic related to analyzing methods, techniques, and tools for the use of intelligent agents to solve current and future problems. Students engage in discussion demonstrating their knowledge of the concepts covered each week and how they are applied and integrated in developing back-end applications.

All classes are required to use the Discussion Board. Participation through DB is an integral part of this course. It is defined as active engagement in a discussion or other activity. Instructors determine the type of activities and their due dates; moreover, different DB activities have different substance and length guidelines. The instructor provides specific instructions to students.

A student posts an answer to a weekly discussion topic in Discussion Board. The student also posts a response to two other students' posts by the end of each module. Comments and questions should be clear and thoughtful, with correct grammar, spelling, and punctuation. The instructor grades the quality of the discussion postings on both content and response. Questions or comments specifically for the instructor should be emailed directly to the instructor.

Although the DB postings' tone can be informal, the instructor expects the content to be on a professional level. Student comments and questions for discussion should be clear and thoughtful, with correct grammar, spelling, and punctuation. As with written assignments, the discussion postings' quality is graded on both content and presentation.

<i>DB Criteria</i>	<i>% of Grade</i>
Participation	50%
Writing	50%
TOTAL	100%

Hands-On Skills (HOS)

The instructor assigns Hands-on Skill exercises to practice using tools and writing programs currently used to develop intelligent agents. These exercises prepare students for the Virtual Labs and the Team project. Students can work in pairs in class, or individually online.

<i>HOS Criteria</i>	<i>% of Grade</i>
Practice Exercise	80%
Engagement	20%
TOTAL	100%

Virtual Labs (VL)

Students complete a set of Virtual Labs using environments such as the Azure AI cloud computing environment and apply principles and methods of intelligent agents to small-scale practical problems. The labs prepare students for their team project. The labs must be individually performed.

Programs should deliver correct answers to all valid input and produce comprehensible error messages on invalid input. Programs also run correctly on all test data given within a reasonable amount of time. Students document their programs following best practice ensuring others understand the logic of the applications.

<i>VL Criteria</i>	<i>% of Grade</i>
Accuracy	80%
Writing	20%
TOTAL	100%

Knowledge Check (KC)

Students demonstrate their understanding of intelligent agent systems and their application in business and industry through weekly quizzes. These weekly quizzes focus on the underlying principles and concepts rather than memorization to solve the quizzes.

<i>KC Criteria</i>	<i>% of Grade</i>
Correctness	100%
TOTAL	100%

Team Project (TP) – Design and implement an agent-based system using cloud AI framework and services.

Using the knowledge acquired through lectures, practical tools implementation and exercises in HOSs and VLs, students implement an agent-based conversational AI application using a cloud framework and services. Students research approaches to orchestrate conversational AI, identify a case use, future applications, and implement a prototype. Prototypes need to be tested, and if feasible, students update the prototype or make recommendations for future updates and implementations. Students identify guiding principles for responsible AI such as fairness, inclusiveness, transparency, accountability, privacy, and security. Proposed use cases need to be approved by the instructor.

A team proposed project must be first approved by the instructor. Each project consists of four elements: a proposal, a progress report, a final report of 6-7 pages, and a final presentation with slides. Templates are provided for each element by the instructor. Students add elements to their project weekly, incorporating feedback from their instructor.

Students use evidence to support the contentions they have drawn from their findings and critically analyze their cited resources. Resources should include assigned course materials and additional sources students have investigated and researched not assigned by the professor. Students use technical writing style of reporting using APA formatting for citations and references.

The instructor provides specific team project requirements in the course shell.

TP Report

The students submit a report formatted based on a template provided by the instructor; students can use their own format, though all components included in the template, as outlined in the agenda, need to be covered. Students improve their writing iteratively and incrementally every week based on the feedback received from the instructor, adding new required sections to the existing paper with every deliverable.

The final report is the culmination of applied research and activities conducted throughout the quarter. The final report/paper provides a detailed problem and its solution encountered in organizations.

Grading for TP01 and TP02

<i>TP01 & 02 Criteria</i>	<i>% of Grade</i>
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Structure	20%
Content	30%
Writing	30%
Reference	10%
Collaboration	10%
TOTAL	100%

TP Presentation

The Team reports research outcomes, development, or other project efforts to an academically appropriate committee in a public forum. The nature of the presentation content determines the specific makeup of the audience. The Team chooses the format of the presentation in consultation with the advisor. The layout and design must be appropriate and adequate to represent the outcome of the effort. While students must make some form of a visual presentation, the presentation of the results may include publishing in a refereed publication, publication in a trade or popular magazine or journal, broadcast in an appropriate medium, or, in exceptional cases, limited dissemination within a closed community.

Each Team has 15 minutes for a presentation and 5 minutes for questions and answers. Each presenter must keep the total presentation time limit strictly.

<i>TP Presentation Criteria</i>	<i>% of Grade</i>
Structure	20%
Visual Presentation	30%
Verbal Quality & Engagement	30%
Collaboration	20%
TOTAL	100%

Course Policies

Course policies on Late Assignments, Participation, and Professional Writing are found under Course Information in the online course menu. Students are responsible for reviewing and applying these policies while enrolled in this course.

University Policies

You are responsible for understanding and adhering to all of City University of Seattle's academic policies. The most current versions of these policies can be found in the University Catalog that is linked from the CityU Web site.

Antidiscrimination

City University of Seattle and its staff and faculty are committed to supporting our students. We value equity, diversity, and inclusion as a way of life as well as the educational opportunities it

provides. City U will not tolerate any form of discrimination based on race, color, ethnicity, sexual orientation, gender identification, socioeconomic status, or religious values. If you have experienced any discrimination based on any of the above, we encourage you to report this to the University. Please report this to your instructor. If you do not feel safe reporting this to your instructor, please report to Dr. Scott Carnz, Provost or to the Vice President of Student Affairs, Melissa Mecham.

Non-Discrimination & Prohibition of Sexual Misconduct

City University of Seattle adheres to all federal, state, and local civil rights laws prohibiting discrimination in employment and education. The University is committed to ensuring that the education environment is bounded by standards of mutual respect and safety and is free from discriminatory practices.

In the U.S., the University is required by Title IX of the Education Amendments of 1972 to ensure that all of its education programs and activities do not discriminate on the basis of sex/gender. Sex include sex, sex stereotypes, gender identity, gender expression, sexual orientation, and pregnancy or parenting status. Sexual harassment, sexual assault, dating and domestic violence, and stalking are forms of sex discrimination, which are prohibited under Title IX and by City University of Seattle policy. City University of Seattle also prohibits retaliation against any person opposing discrimination or participating in any discrimination investigation or complaint process internal or external to the institution. Questions regarding Title IX, including its application and/or concerns about noncompliance, should be directed to the Title IX Coordinator. For a complete copy of the policy or for more information, visit <https://my.cityu.edu/titleix> or contact the Title IX Coordinator.

In Canada, in compliance with the British Columbia Human Rights Code, the Alberta Human Rights Act, WorksafeBC, and the Workers' Compensation Board of Alberta, the University believes that its environment should at all times be supportive and respectful of the dignity and self-esteem of individuals. Discrimination, harassment and bullying conduct, whether through person to person behaviour or via electronic communications such as email or social media is not acceptable and will not be tolerated. As an educational institution, it is our responsibility to cultivate an environment of excellence, equity, mutual respect and to recognize the value and potential of every individual. The University will take all necessary steps to meet or exceed the requirements of the law to prevent discrimination, harassment and bullying. The Respectful Workplace Policy for the prevention of discrimination, harassment and bullying policy and procedure can be found at <https://www.cityu.edu/discover-cityu/about-cityu/> under the Policies section or at <https://www.cityuniversity.ca/about/> .

Religious Accommodations

City University of Seattle has a policy for accommodation of student absences or significant hardship due to reasons of faith or conscience, or for organized religious activities. The University's policy, including more information about how to request an accommodation, is available in the University Catalog and on the my.cityu.edu student portal. Accommodations must be requested by the 20% mark of this course (e.g. day 14 of a ten-week course, day 7 of a 5-week course) using the Religious Accommodations Request Form found on the student dashboard in the my.cityu.edu student portal.

Academic Integrity

Academic integrity in students requires the pursuit of scholarly activity that is free from fraud, deception and unauthorized collaboration with other individuals. Students are responsible for understanding CityU's policy on academic integrity and adhering to its standards in meeting all course requirements. A complete copy of this policy can be found in the [University Catalog](#) in the section titled *Academic Integrity Policy* under *Student Rights & Responsibilities*.

Attendance

Students taking courses in any format at the University are expected to be diligent in their studies and to attend class regularly. Regular class attendance is important in achieving learning outcomes in the course and may be a valid consideration in determining the final grade. For classes where a physical presence is required, a student has attended if they are present at any time during the class session. For online classes, a student has attended if they have posted or submitted an assignment. A complete copy of this policy can be found in the [University Catalog](#) in the section titled Attendance under Student Rights & Responsibilities.

Final Assignments Due Date

Final assignments for each class at CityU must be due on or before the final date of the course as indicated in the university's course information system. Due dates that extend beyond the final date of the course may negatively impact tuition funding for students.

Support Services

Disability Services & Accommodations

Students with a documented disability who wish to request academic accommodations are encouraged to contact Disability Support Services to discuss accommodation requests and eligibility requirements. Please contact Disability Support Services at disability@cityu.edu or 206.239.4752 or visit the [Disability Support Services](#) page in the my.cityu.edu portal. Confidentiality will be observed in all inquiries. Once approved, information about academic accommodations will be shared with course instructors.

Library Services

CityU librarians are available to help students find the resources and information they need to succeed in this course. Contact a CityU librarian through the [Ask a Librarian](#) service, or access [library resources and services](#) online, 24 hours a day, seven days a week.

Smarthinking Tutoring

CityU students have 24/7 access to free online tutoring offered through Smarthinking, including writing support, from certified tutors. Contact CityU's Student Support Center at mycityusupport@cityu.edu to request a username and password.