

**COMP 5313 WA: Artificial Intelligence**

Department of Computer Science

Winter 2024

**Instructor Information**

Instructor: Dr. **Sabah Mohammed**, Full Professor and Professional Engineer

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Office Hours: Monday 1:00-2:00 PM

**Teaching Assistant (TA) Information**: TBA (An email will be send at the beginning of the term)

**Course Identification**

Course Number: COMP5313

Course Name: Artificial Intelligence

Course Location: AT1007 + D2L (for Course Materials, Assignments Zoom Video Lectures)

Class Times: 11:30AM-2:30AM **M (F2F)**

**Course Description/Overview** -

The course deals with a broad range of advanced types of artificial intelligence (AI). A specific emphasis will be on the logical reasoning and symbolic AI as well as the connectionist AI. The graduate student will learn the basics of modern AI as well as some of the representative applications of AI. Through an engaging mix of introductions to key AI venue technologies like conversational AI, Intuition-Based AI, Symbolic AI, Connectionist AI, State-Space AI, Logic Based AI and Possibilistic AI with variety of Machine Learning (Supervised, Unsupervised and Ensemble Learning), your learning journey will bring into sharp focus the reality of central AI technologies today and how they can be harnessed to support the research and innovation needs. The algorithms and techniques introduced in this course will enable the grad student to apply it to a wide variety of artificial intelligence problems including gaming, searching, reasoning and learning when dealing with variety of knowledge (Textual, Visual, Symbolic etc.). This course will serve as a foundation for further research in any AI application area you may choose to pursue. This is a unique and important course that will use Python 3 as the implementation playground. Along the long way of our experience in this field, I hope to excite you about the numerous applications and huge possibilities in the field of AI, which continues to expand human capability beyond our imagination.

**Calendar\_Link:** http://csdc.lakeheadu.ca/~/Catalog/ViewCatalog.aspx?pageid=viewcatalog&catalogid=27&topicgroupid=27430

**Course Learning Objectives**

By the end of this course, students will be able to:

* Compare AI with human intelligence and traditional information processing and discuss its strengths and limitations as well as its application to complex and human-centered problems.
* Discuss the core concepts and algorithms of advanced AI
* Apply the basic principles, models, and algorithms of AI to recognize, model, and solve problems in the analysis and design of information systems.
* Analyze the structures and algorithms of a selection of techniques related to **searching, reasoning, machine learning, and language processing.**
* Design AI functions and components in Python involved in intelligent systems such as computer games, expert systems, semantic web, information retrieval, machine translation, mobile robots, decision support systems, and intelligent tutoring systems.
* Review research articles from well-known AI journals and conference proceedings regarding the theories and applications of AI.

**Course Resources**

Course Website and Software Resources:

* **Anaconda IDE for Python 3**: <https://www.anaconda.com/products/individual>

**Required Course Text(s)**

1. Artificial Intelligence with Python - Second Edition, Alberto Artasanchez and Prateek Joshi, Packt Publishing (Jan. 31 2020), ISBN-10: 183921953X
2. Artificial Intelligence: Foundations of Computational Agents, 2nd Edition, David L. Poole and Alan K. Mackworth, University of British Columbia, September 2017, ISBN: 9781107195394, Cambridge University Press

**Course Schedule/Outline**

|  |  |  |  |
| --- | --- | --- | --- |
| **Schedule 1** | **Lecture Title** | **New Tasks Date** | **Finished Tasks Date**  **(Submission to D2L)** |
| **Jan 10, 2024** | L1: Conversational AI | Project 1 (15%) +  Conversational AI (CAI) Contest (10%) |  |
| **Jan 17, 2024** | L2: Intuition Based AI | Exercise 1 (5%) |  |
| **Jan 24, 2024** | L3: Symbolic AI | Assignment 1 (10%) | Exercise 1 |
| **Jan 31, 2024** | L4: Connectionist AI |  |  |
| **Feb 7, 2024** | L5: State Space AI | Exercise 2 (5%) | Assignment 1 |
| **Feb 14, 2024** | **L6: Logic-Based AI** |  | Project 1 |
| **Feb 21, 2024** | **Study Break** |  |  |
| **Feb 28, 2024** | L7: Possibilistic AI | Project 2 (15%), Assignment 2 (10%) | Exercise 2 |
| **March 6, 2024** | L8: AI with Supervised Learning |  |  |
| **March 13, 2024** | L9:  **AI with Unsupervised Learning** |  | Assignment 2 |
| **March 20, 2024** | L10: AI with Ensemble Learning |  |  |
| **March 27, 2024** | **Final Exam (30%)- Exam will be Conducted Over ZOOM** |  | Project 2 |
| **April 3, 2024** | **L11:**  CAI **Contest Presentations** |  | CAI Context Executive Summary |

**Assignments and Evaluations**

Be sure to list everything that you intend to use to calculate the final course mark. A table works well here. Note - If you plan to include some kind of participation mark, be clear about your expectations.

|  |  |  |
| --- | --- | --- |
| Item | Date(s) | Value |
| Assignments | See Schedule | 20% |
| Exercises | See Schedule | 10% |
| Contest | See Schedule | 10% |
| Projects (Presentations 5% + Programming 10% for Each Project) | See Schedule and You will present your project s using Zoom (10Min) | 30% |
| Final Exam | Zoom + D2L will be used- More Instructions to Follow (See Schedule)- Show Your Student ID | 30% |
| Class participation | Exceptional Class Participation | 5% Bonus |
| Total |  | 100 +5 |

**Late Assignments**

Late assignments will be deducted 1 Mark for each 1hour delay and up to 3hrs. After the three hours late assignments will automatically receive a 0 mark.

**Assignments/Exercise/Projects**

Detailed descriptions of the course tasks will provided at your D2L. Please see the course schedule for the time these tasks will appear at the D2L and for the due dates for submitting them.

**Virtual Lab:**

You may like to use the university virtual lab for your programming: http://lakeheadu.ca/labs.

**Course Policies**

My expectations for our course policies are as follows:

* Student should follow the behavioral standards (<https://www.lakeheadu.ca/students/student-life/student-conduct/academic-integrity/node/51239>)
* Zoom Attendance is highly encouraged,
* Office Hours via D2L Chat at the specified time (See above).

**Academic Integrity Statement:**

I understand and agree that:

(1) Unless otherwise allowed by the course instructor, I must complete the assignments in this course without the assistance of anyone else.

(2) Unless otherwise allowed by the course instructor, I must not access any sources or materials (in print, online, or in any other way) to complete any course exam.

I further understand and agree that, if I violate either of these two rules, or if I provide any false or misleading information about my completion of course assignments or exams, I may be prosecuted under the Lakehead University Student Code of Conduct – Academic Integrity, which requires students to act ethically and with integrity in academic matters and to demonstrate behaviours that support the University’s academic values.

**Copyright**

Students should be aware that all instructional, reference, and administrative materials prepared for this course are protected in their entirety by copyright. Students are expected to comply with this copyright by only accessing and using the course materials for personal educational use related to the course, and that the materials cannot be shared in any way, without the written authorization of the course instructor. If this copyright is infringed in anyway, students may be prosecuted under the Lakehead University Student Code of Conduct – Academic Integrity, which requires students to act ethically and with integrity in academic matters and to demonstrate behaviours that support the University’s academic values.

**Zoom Recording Policy**

In COMP4411, in the context of remote instruction and participation, video and audio recordings of class activities will be made to ensure students' and instructors' easy and comprehensive access to those activities. The recordings are **confidential** and are intended only for the use of the course students and instructors. They may otherwise not be used or disclosed. During recording, to protect others' privacy, each student should ensure that no one else is present in the location where they are being recorded without that non-student's consent. The recordings are made under the authority of sections 3 and 14 of The Lakehead University Act, 1965. Questions about the collection of the images and sounds in the recordings may be directed to Dr. V. Mago.

**Regulations**

It is the responsibility of each student registered at Lakehead University to be familiar with, and comply with all the terms, requirements, regulations, policies and conditions in the Lakehead University [Academic Calendar](http://navigator.lakeheadu.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&catalogid=25&chapterid=6999&loaduseredits=False). This includes, but is not limited to, Academic Program Requirements, Academic Schedule of Dates, University and Faculty/School Policies and Regulations and the Fees and Refund Policies and Schedules (Lakehead University Regulations webpage, 2020-21).

**Academic Integrity**

A breach of Academic Integrity is a serious offence. The principle of Academic Integrity, particularly of doing one’s own work, documenting properly (including use of quotation marks, appropriate paraphrasing and referencing/citation), collaborating appropriately, and avoiding misrepresentation, is a core principle in university study. Students should view the [Student Code of Conduct - Academic Integrity](https://www.lakeheadu.ca/students/student-life/student-conduct/academic-integrity/node/51239) for a full description of academic offences, procedures when Academic Integrity breaches are suspected and sanctions for breaches of Academic Integrity.

**Supports for Students** – there are many resources available to support students. These include but are not limited to:

* [Health and Wellness](https://www.lakeheadu.ca/current-students/student-health-and-counselling-centre)
* [Student Success Centre](https://www.lakeheadu.ca/current-students/student-success-centre)
* [Student Accessibility Centre](https://www.lakeheadu.ca/current-students/student-services/accessibility/)
* [Library](https://library.lakeheadu.ca/)
* [Lakehead International](https://www.lakeheadu.ca/international)
* [Indigenous Initiatives](https://www.lakeheadu.ca/indigenous)

Lakehead University is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities and/or medical conditions to ensure they have an equitable opportunity to participate in all of their academic activities. If you are a student with a disability and think you may need accommodations, you are strongly encouraged to contact Student Accessibility Services (SAS) and register as early as possible. For more information, please contact [Student Accessibility Services](http://studentaccessibility.lakeheadu.ca/)  (SC0003, 343-8047 or [sas@lakeheadu.ca](mailto:sas@lakeheadu.ca))