COMP 474/6741 Intelligent Systems

***Lectures*: Online (pre-recorded) or on-campus** | ***Labs:* Online (Zoom) or on-campus**
***Instructor*: Dr. René Witte (Associate Professor)** | ***Office:* Online (Zoom) or on-campus**
***Email:* rene.witte@concordia.ca** | ***Office hours*: scheduled on Moodle**

Calendar Course Description

(COMP 474): Prerequisite: COMP 352 or COEN 352. Rule-based expert systems, blackboard architecture, and agent-based. Knowledge acquisition and representation. Uncertainty and conflict resolution. Reasoning and explanation. Design of intelligent systems. Project. Lectures: three hours per week. Laboratory: two hours per week.

(COMP 6741): Knowledge representation and reasoning. Uncertainty and conflict resolution. Design of intelligent systems. Grammar-based, rule-based, and blackboard architectures. A project is required. Laboratory: two hours per week.

Prerequisite Knowledge

You must be familiar with programming in an object-oriented language, such as *Java* or *Python* (we will provide a brief introduction to Python as part of the first lab session). Previous knowledge of Artificial Intelligence (AI), Natural Language Processing (NLP), Information Retrieval (IR), and/or Machine Learning (ML) is helpful, but not required.

Objectives

The goal of this course is to become familiar with modern "intelligent" (Artificial Intelligence, AI)-based software systems, that is, software that incorporates algorithms or methods from one of the fields mentioned above (AI, ML, NLP, IR), in whole or part. Compared to other courses introducing these concepts, this IS course places a stronger emphasis on the overall design, implementation and evaluation of a complete AI application. In particular, we will examine modern intelligent assistants, including chatbots, and study their foundations in Natural Language Processing, Knowledge Graphs, and Personalization.

General Information

The course will start online for at least the first two weeks of the term. Changes to the delivery format (online vs. on-campus) will be announced on the course Moodle web site.

This course has weekly lectures and lab sessions. For each week, lecture slides will be made available through the course Moodle web site. During remote delivery, pre-recorded lectures will be published on Moodle for each week.

For most lectures, *worksheets* will be provided that you must go through while following the lecture material. While the course is offered online, you can post your answers on Moodle to receive feedback (detailed instructions will be provided on Moodle); otherwise, they will be used in class.

Additional online activities and office hours will also be announced and scheduled on Moodle.

Course Moodle Web Site

Amendments to this syllabus, if any, as well as other important information will be made available through the course's Moodle site. The Moodle site also provides additional reading material, as well as discussion forums for asking questions on lecture topics, the project, exams, etc. Note that you must be registered for the course to access the Moodle site (there is a one-day delay between registering and receiving Moodle access).

Evaluation

Your grade will be based on exams and a team project (split into multiple submissions). The format of the exams will depends on the delivery format of course: online Moodle Quizzes if the course continues to be offered remote, otherwise on-campus exams, or a mix of both. The distribution of these deliverables is as follows:

40% Course Project (split into several assignments)
60% Exams (On-campus mid-term/final and/or online Moodle Quizzes)

There is no standard relationship between percentages and letter grades assigned for this course. In order to pass the course you must receive at least 50% of the overall possible marks.

Should you fail to write one of the quizzes/mid-term exams ***and*** you have valid justification (e.g., doctor's note) then the weight of the missed quiz/midterm will be added to the other quizzes/final exam.

Note: It is your responsibility to adhere to the ***university's code of conduct*** as detailed in the academic calendar.

Conditions Specific to Remote Teaching and Assessment

1 All students are expected to have access to a computer with the following capabilities:
  1.a reliable internet connection
  1.b camera and microphone (your computer and/or cellphone)
2 All students should install VPN for remote desktop access to Concordia University computer labs https://www.concordia.ca/it/support/connect-from-home.html
  Once you have VPN connection to Concordia University, you can access all available software in Gina Cody School labs by following the process described in:
  https://www.concordia.ca/ginacody/aits/support/faq/connect-from-home.html
3 Course specific software: You should install the *Python* programming language, together with a suitable IDE. Further details on the required course software will be available on the course Moodle web site.
4 If the course continues to be delivered remotely, all students will be required to do online, timed exams:
  4.a Exams will be done through Moodle Quiz.
  4.b The exams will take place during the lecture time period on dates that will be announced on Moodle at least a week in advance.
  4.c You will be responsible for ensuring appropriate, properly functioning technology (webcam, a microphone, appropriate browser and an ability to download any necessary software, as well as a reliable internet connection with a minimum of a 3G connection).
  4.d You will need a quiet place within which to take the quizzes. Earplugs or noise-canceling headphones that are not connected to a device may also be used to allow you to focus for the duration of the exam.
  4.e The course instructor reserves the right to conduct an individual oral examination to verify student's response to online exam, project, or assignment questions.
5 Academic Integrity
  Violation of the Academic Code of Conduct in any form will be severely dealt with. This includes copying (even with modifications) of program segments. You must demonstrate independent thought through your submitted work. The Academic Code of Conduct of Concordia University is available at: https://www.concordia.ca/conduct/academic-integrity.html

  It is expected that during class discussions, in the online forums and in your written assignments you will communicate constructively and respectfully. Sexist, racist, homophobic, ageist, and ablest expressions will not be tolerated.

  All students must read and sign the Expectations of Originality form and submit the signed copy with their assignments and project.

Course Content and Schedule

We will cover the following topic(s) in each week (note that the weekly schedule may be subject to change):

(Week 1) Introduction to Intelligent Systems
(Week 2) Introduction to Knowledge Graphs (RDF)
(Week 3) Knowledge Graphs: Vocabularies & Ontologies (RDFS, OWL)
(Week 4) Knowledge Base Queries (SPARQL)
(Week 5) Linked Open Data (LOD) & Applications
(Week 6) Personalization & Recommender Systems
(Week 7) Introduction to Machine Learning for Intelligent Systems
(Week 8) Intelligent Agents: Chatbots & Introduction to Natural Language Processing (NLP)
(Week 9) NLP Applications & Text Mining Systems
(Week 10) Introduction to Artificial Neural Networks
(Week 11) Introduction to Deep Learning
(Week 12) Deep Learning for Intelligent Systems
(Week 13) Conclusions

There will not be time to cover all of these topics in-depth. Other topics of interest to the class may also be included. A more detailed week-by-week breakdown, as well as additional information for each topic, will be available on the Moodle website.

Textbook

There is no single textbook for this course; readings for each lecture topic will be provided on Moodle. Generally, these readings will be available online or as an electronic resource through the Concordia Library.

Lab Sessions

There will be a weekly lab session, starting Week 2. Note that lab sessions are a mandatory part of the course. Lab sessions will be either online (remote) or on-campus:

1. Remote lab sessions take place online, during the dedicated lab time slots, using Zoom and are not recorded.
2. On-campus lab sessions take place as scheduled and you have to attend the section (room, time) you are registered in.

Please confirm on Moodle whether the lab sessions for a given week take place on-campus or online.

The weekly lab sessions generally cover the lecture material from the previous week. It is a prerequisite before attending each lab that you studies the lecture material, readings, and worked on the corresponding worksheet from the week before.

Course Project

As part of the course, you will work on a project developing an intelligent software system. The project is split into multiple project assignments that build on each other and you will have to demo your project as a team during dedicated online (Zoom) or on-campus sessions. You can work on the project in teams as follows:

- Students in COMP 474 can do the projects in teams of at most 4.
- Students in COMP 6741 must do the project in teams of 2.

Note: Mixed teams (including both graduate and undergraduate students) are not possible.

Disclaimer

In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.

On Campus Resources

HEALTH SERVICES An on-campus health clinic and health promotion center with nurses and doctors. SGW 514-848-2424 ext. 3565 LOY 514-848-2424 ext. 3575	**COUNSELLING AND PSYCHOLOGICAL SERVICES** Counsellors (licensed mental health professionals) work with students to address their mental health and wellbeing needs. SGW 514-848-2424 ext. 3545 LOY 514 848-2424 ext. 3555
ACCESS CENTRE FOR STUDENTS WITH DISABILITIES Supports students with a variety of disability conditions (including temporary disabilities arising from illness or injury). Students receive academic support for their educational experience at Concordia. acsdinfo@concordia.ca 514-848-2424 ext. 3525	**SEXUAL ASSAULT RESOURCE CENTRE** Provides confidential and non-judgemental support and services to students, staff and faculty of all genders and orientations affected by sexual violence and/or harassment. Jennifer Drummond, Coordinator jennifer.drummond@concordia.ca sarc@concordia.ca 514-848-2424 ext. 3353
STUDENT SUCCESS CENTRE Support network from first-year to graduation. You'll find one-on-one tutors, study groups, workshops as well as learning and career advisors 514-848-2424, ext. 3921	**DEAN OF STUDENTS** Supports students to enhance their Concordia experience by engaging in student life outside the classroom. Terry Kyle, Manager deanofstudents.office@concordia.ca SGW 514-848-2424 ext. 3517 LOY 514-848-2424 ext. 4239
ABORIGINAL STUDENT RESOURCE CENTRE An on-campus resource for First Nations, Métis and Inuit students that helps them make the most of the many resources available at the university. Orenda Konwawennotion Boucher-Curotte, Coordinator orenda.boucher@concordia.ca 514-848-2424 ext. 7327	**INTERNATIONAL STUDENTS OFFICE** Supporting international students with immigration documents, health insurance, social events, and workshops. iso@concordia.ca 514-848-2424 ext. 3515
STUDENT ADVOCACY OFFICE Advocating for students facing charges under the Academic Code of Conduct or the Code of Rights and Responsibilities. studentadvocates@concordia.ca 514-848-2424, ext. 3992	**MULTI-FAITH & SPIRITUALITY CENTRE** Provides a home for all those wishing to celebrate the human spirit in the widest sense of the word, through programs, events and a quiet space for reflection. Ellie Hummel, Coordinator mfsc@concordia.ca 514-848-2424, ext. 3593
CAMPUS SECURITY Ensures the safety of our members and campus property through prevention, surveillance, intervention, training, and education. Provides emergency medical services. security@concordia.ca 514-848-3717 (dial 1 for urgent situations; dial 2 for non-urgent situations)	**CONCORDIA UNIVERSITY STUDENT PARENTS CENTRE** An accessible space for student parents to study, share interests and develop a support network. Sumaiya Gangat, Coordinator cusp@concordia.ca 514-848-2424, ext. 2431