COMP 474/6741
Intelligent Systems

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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.

(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.

Lectures: three hours per week. Laboratory: two hours per week.

Objectives

Foundations and Applications of Intelligent Systems

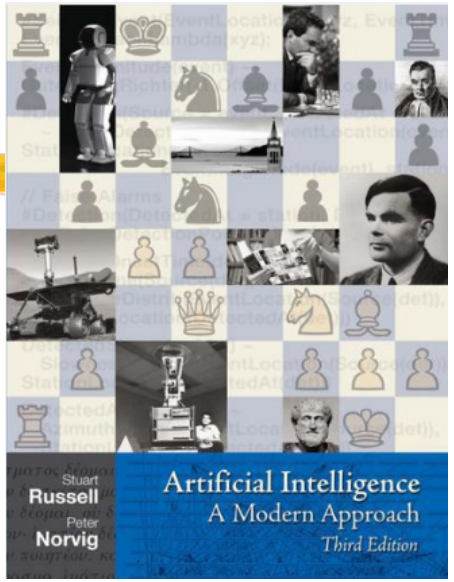
- **Systems:** here *Software* systems (sorry, no robots!)
  (also, no *games,* or *graphics/vision/audio*)
- **Intelligent:** systems that incorporate (in whole or part)
  Artificial Intelligence (AI) techniques
- Focus on *applications* of algorithms and methods taught in
  AI, Natural Language Processing (NLP),
  Machine Learning (ML) and Information Retrieval (IR)
- In particular, focus on (i) Knowledge Graphs;
  (ii) Intelligents Agents (Chatbots, Digital Assistants)
  (iii) Machine Learning/Deep Learning for NLP
- Stand-alone course, so some overlap with the other AI
  courses (AI, ML/DL, NLP, IR)

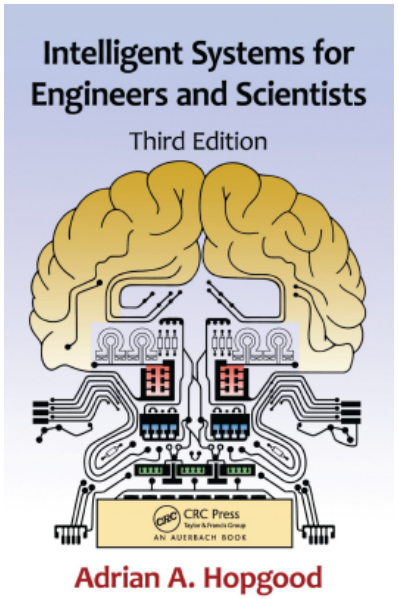
General Information

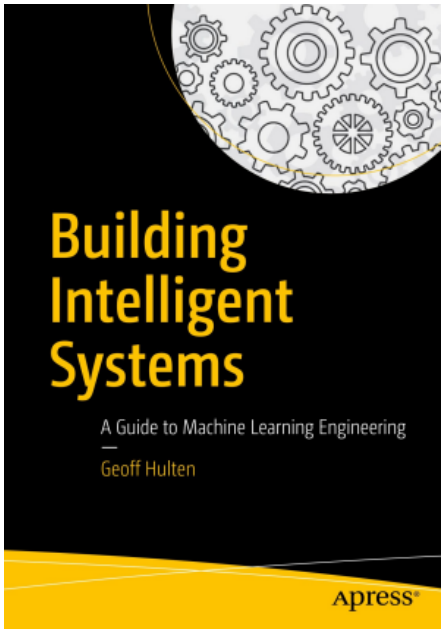
- This course has a **lecture** and a **laboratory.**
- Generally, lecture slides will be made available from the course **Moodle** web site.
- **Everything is in-person (on campus)**
  - Unless Covid comes back...

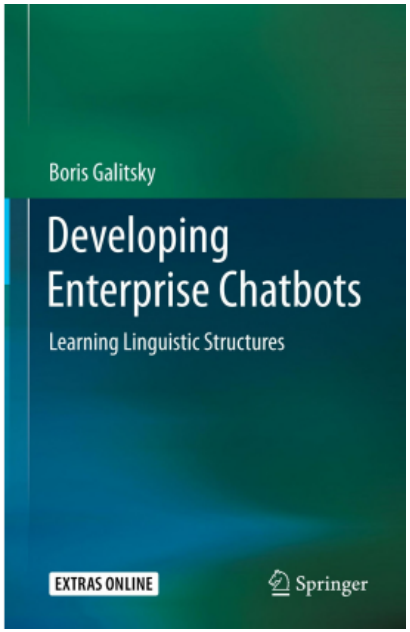
Course Literature

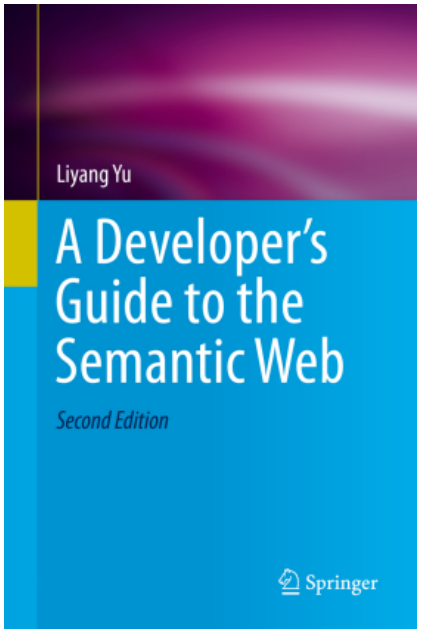
- **No single textbook:**
  readings will be provided for each lecture topic
- Available at the Concordia Library or online











Evaluation Scheme

1. Course Project

- Team project:

  COMP 474 students: teams of 4
  COMP 6741 students: teams of 2
  (no mixed teams grad/ugrad)

- Split into 2-3 project assignments
  (assignments build on top of each other)
- Building an intelligent system
- Project must be demoed (on-campus) and all team members must be present
- Teams will be formed after the DNE deadline!

Evaluation Scheme (1)

2. Exams

- Midterm Exam *(tentatively scheduled in Week 8)*
- Final Exam *(during examination period)*
- Closed book, multiple choice exams

Grading

Project	35%
Midterm Exam	15%
Final Exam	50%
Total	**100%**

Notes:

- You need at least 50% of the total marks to pass this course
- If your final exam grade (expressed as a percentage) is higher than your mid-term exam grade, the mid-term exam will be excluded from the calculation of your overall course grade (however, you must have written the midterm for this to apply)
- There is **no fixed**, a priori relationship between the numerical percentage and the final letter grades for this course

RIGHTS AND RESPONSIBILITIES

Plagarism

- The most common offense under the Academic Code of Conduct is plagiarism which the Code defines as “the presentation of the work of another person as one’s own or without proper acknowledgement.”
- **In Simple Words:**

  Do not copy, paraphrase or translate anything from anywhere without saying from where you obtained it!
- **http://www.concordia.ca/students/academic-integrity.html**
- **Note:** Make sure you do not share course work (e.g., keep GitHub project repositories private)
- This also applies to work “created” by tools like ChatGPT

Lab Sessions (starting Week 2)

Current lab schedule (please check online for updates):

- Current lab schedule:
  - UUUI Tu 3:00PM – 5:00PM H 929
  - UUUJ Tu 6:00PM – 8:00PM H 823
  - UUUK Tu 6:00PM – 8:00PM H 827
- Labs are also in-person (on-campus)
- The TAs will help you with the weekly lab exercises (e.g., running AI experiments using Python), as well as the course project
- **You must attend the lab section you are registered in!**
- **Be prepared by going through the previous week's lecture material (readings, worksheets) before the lab**

Office Hours (a.k.a. how to reach me)

Office Hours (starting Week 2)

- On campus (ER 933), every Thursday 16:00-17:00
- Online meetings (via Zoom), scheduled on-demand via Moodle
- You can also reach me through Moodle Chat
  (works best for short, quick questions)
- Please post general (non-personal/private) questions on the Moodle Discussion Forum

Course Content and Schedule (I)

Detailed Week-by-Week Content List (Tentative)

1. Introduction to Intelligent Systems
2. Introduction to Knowledge Graphs (RDF)
3. Knowledge Graphs: Vocabularies & Ontologies (RDFS, OWL)
4. Knowledge Base Queries (SPARQL) & Linked Open Data (LOD)
5. Personalization & Recommender Systems
6. Introduction to Machine Learning for IS

Mid-term break (February 25-March 2)

Course Content and Schedule (II)

Detailed Week-by-Week Content List (tentative) contd.

7. *Midterm Exam (tentative)*
8. Intelligent Agents: Chatbots & Introduction to NLP
9. Text Mining Systems
10. Artificial Neural Networks (ANNs) & Word Embeddings
11. Introduction to Deep Learning
12. Deep Learning for Intelligent Systems

Final Exam (during examination period)

(see Moodle for detailed, updated schedule)

Embracing Active Learning

What is Active Learning?

- Active Learning involves engaging with the material, classmates, and instructor in a more interactive way than simply listening to a lecture

Why Active Learning?

- **Enhanced Retention:** Research shows you remember more when you actively engage with material
- **Immediate Feedback:** Worksheets and pair discussions allow you to instantly clarify doubts and reinforce understanding
- **Peer Learning:** Working with classmates exposes you to different perspectives and problem-solving approaches

Common Concerns Addressed

- **Feeling Shy?:** No worries! Active learning tasks are designed to be non-judgmental spaces for exploration. You won't be put "on the spot".
- **Don't Want to Interact?:** While collaboration is encouraged, the primary focus is on deepening your own understanding. Active learning can be a personal process too.