Syllabus CMPT 310
January 2021

Artificial Intelligence Survey (CMPT 310)
Simon Fraser University
Instructor: Oliver Schulte

Textbook. Artificial Intelligence: A Modern Approach (3rd Edition), Stuart Russell, Peter Norvig, Prentice Hall, 2010.

References

- Computational Intelligence - A Logical Approach, David Poole et al, Oxford University Press.
- Artificial Intelligence (5th Edition). Structures and Strategies for Complex Problem Solving, George Luger, Addison Wesley.
- The textbook authors maintain a comprehensive list of on-line AI resources http://aima.cs.berkeley.edu/books.html

Overview. Artificial Intelligence (AI) is the study and design of intelligent agents. This spans a range of topics, from applications like decision support for large organizations, to foundational questions like the nature of rational decision-making. The goal of this course is to provide students with a survey of different aspects of artificial intelligence. A variety of approaches with general applicability will be developed. We will start with the definition of intelligence as maximizing expected utility, including in a multi-agent setting (game theory). Then we discuss the AI-as-search paradigm, and describe generic search strategies and heuristic-based improvements. A widely used design methodology for AI systems is using learning to improve their performance on a given task. The use of probability for representing knowledge will be presented, with a focus on Bayesian networks. Probability theory also serves as a methodology for handling uncertainty in AI. The capstone topic in the course is reinforcement learning, which combines learning, probability, and decision-making in a single framework for designing intelligent agents.

Class Format. The classes are basically lecture classes. There won't be much time to discuss the assignments in detail, but we will send out solutions. I will vary the lecture format for in-class exercises and discussions. I plan in-class surveys using mobile Canvas; **you must be equipped to take part in these quizzes.**

Studying For This Class. The reading assignment for each week is given on the lecture schedule. You should read each assigned reading at least *twice*. It's a good idea to form study s/pairs for discussing (not copying) the readings, assignments, and other parts of the class.

Workload Model.

Weekly Work (see http://www.sfu.ca/computing/current-students/undergraduate-students/programs/computing-science-major.html)

5	Assumed Number of Semester Courses
40/5=8	Total Number of hours per week per course
-3 hrs	Class Attendance
-3 hrs	Reading
-2 hrs	Assignment average per week
+0 hrs	Balance

Assignment Workload

13	Weeks per semester
13 x 2 = 26 hrs	Total Available Number of Hours for Assignments per term
6 x 3 Assignments = **18**	Hours per Assignment = 6 x 3 regular Assignments
8	Hours for group assignment
26 hrs	Semester Assignment Workload

I aim to design the assignments so that they take less than 6 hours on average. This assumes that you work on the assignments efficiently:

- Read and understand the course readings and lecture notes before doing the assignment.
- Form a study group or duo.
- Get started early and ask questions in office hour before you get stuck.

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Getting in Touch; E-mail

Face-to-face. The best occasion for discussing aspects of the course content is in my office hour. My office hour will have a public part for course content, and a private part with a Zoom waiting room, to discuss individual concerns.

There will be some time at the end of class. You can make an individual appointment with me or with the TA, as well.

Email. I process email only twice a week, so if you want a faster reply than that, please use the in-person avenues. E-mail is an inefficient way to carry on a discussion, and I won't have time to send you back more than a couple of sentences. You should first look at the course web page, course syllabus and the textbook for information.

When to send email.

- For practical or organizational problems.
- To make a special appointment.
- If you send me or the TA e-mail, please **enter "310"** somewhere in the subject line.

When <u>not</u> to send email.

There are various types of information that you can get from the syllabus, the posted course schedule, in class, rom me during my office hour, or from your fellow students. These are not appropriate for e-mail queries and I may not reply by e-mail but only in class. Examples include:

- When is my assignment/midterm/due date?
- What did we cover in class last week?
- Do I need to buy the textbook?
- What are you looking for in this assignment?

On-line support for assignments will be via the public discussion forum. **There will be no private email support for assignments.**

Marking. Your term grade is calculated as

(Quizzes 25%, Assignments 40%, Exam 25%, participation 10%).

Any written component may be supplemented with an oral examination. The mark for the written submission may be revised depending on the performance in the oral exam.

Assignments. There will be two types of assignments: individual exercises to practise concepts and techniques, and a group project that combines learning and natural language processing. Since this is a survey course that emphasizes concepts, I do not plan programming exercises.

Notes on Regular Assignments

- I am planning for a total of 3 regular assignments.
- I encourage you to work in groups. But each student should submit their own write-up (see instructions).
- I urge you to start working on the assignment as soon as it is given out. You will then get more out of the class that deals with the material on the assignment. Also, you can check your understanding against what we discuss in class: you will very likely catch mistakes that way.
- Submission details, grading criteria etc will be posted with the assignment.

Notes on the Group Assignment

- This is intended to be a more challenging task to be done by a group of **at most 6 students.** If you cannot find teammates, you can carry out the project on your own. Each group member will receive the same project grade. The deadline for forming groups is noted on the course schedule.
- You will use learning to build a classification system.

Penalty for Late Submissions

- The exact date and time of your submission will be recorded in the assignment submission web site.
- Students submitting their assignments late will have 20% of the total marks deducted for each working day thereafter, up to a maximum of five working days, at which point a mark of zero will be recorded. If the late period includes a weekend, we count Saturday and Sunday together as one day. (I don't expect the TA to check submissions more than once on the weekend.)

Quizzes. We will have regular quizzes to give you immediate feedback on how well you have followed the course material. The quizzes will cover both material from the lectures and from the text. I will run them as on-line quizzes using the Canvas system. The exact number of quizzes will depend on the class dynamics; roughly I'm planning for 10-15

quizzes. I will discard the worst 2 quizzes for each student, to allow for absences, technical problems, etc. The average of the remaining quiz marks is your overall quiz mark.

Exams. There is one cumulative final exam.

Participation. We will check attendance based on the zoom logs to see if you took part for most of the class.

- I may give bonus points for exceptional participation (this will be rare).
- If you miss a class, you can email TA Danoosh one question that shows you reflected on the class content. E.g. "is the Chinese Room a version of the Turing test?" or "is Iterated Deepening guaranteed to terminate?".
- We will discard 5 missed classes to allow for special circumstances.

Final Grades

Students must attain pass the exam in the course in order to get a C or higher. In other words, if you score less than 50% on the exam, you get at most a D regardless of your score on the assignments. *This is the most common way for students to be assigned a D.*

For converting term marks to letter grades, I do not have cut-offs fixed in advance in light of the exceptional teaching circumstances. In the previous iteration of 310, the cut-offs were as follows.

A+ 92 A 89 A- 86 B+ 84 B 80 B- 78 C+ 72 C 67 C- 60 D 51 F

Excuses and Extensions

My main goal in considering special circumstances is to ensure *fair treatment* for all students. While you will understand the material better the more time you put into studying, I cannot evaluate your effort, only the results.

Valid reasons for an extension. The standard excuse for missing any part of the course requirements (assignment deadlines, exams, etc.) is a *certified medical problem*. You should discuss other reasons with me, preferably in advance. As a rule, I will require documentation of your problem, in the case of medical problems the standard SFU health care provider form (see course website) to be filled out by a physician. Documentation is necessary because otherwise some students abuse make-up options to gain an unfair advantage.

If you have a valid excuse:

– for an assignment or an on-line quiz, I will transfer the weight of what you have missed to the weight of the *exam*.

– for missing an exam, *it will be made up the day after*. You must be available for the exam day or the make-up day, otherwise you will receive 0 for the missed exam.

Invalid reasons for an extension.

Unforeseen circumstances such as breakdown of your car, printer, computer.
Outside commitments like work and travel plans.

I sympathize with these issues but they are not reasons for special treatment. If this worries you, I suggest you do your work ahead of the deadline and put in place alternative ways of getting it to class (e-mail, friends).

Grade Challenges

Valid reasons for making a grade change.

- There was a mistake adding up your points.
- The instructor/TA said the right answer was x. I put down x but got marked wrong.

If you wish to have a grade reconsidered, *write a brief note* stating your reasons. Typically, the note will outline what you take to be the requirements of a good answer, and point out where you believe that you met these requirements. Your note will show us that you have understood the issues involved, and in a class of this size, will help use keep track of our discussions and special circumstances.

<u>Invalid</u> reasons for making a grade change.

- I believe that the question was unclear.
- I disagree with your solution.
- I didn't know this would be on the exam.
- I spent a lot of time on this assignment/exam.
- I need a better grade to (stay in the program, stay in the university, get into business school …).
- My term mark is close to a cut-off.

I sympathize with these issues but they are not sufficient reasons to consider a grade change. If you are not satisfied with your grade on a course component, or in the course, there is a procedure for appealing, starting with the Undergraduate Chair of Computing Science.

Valid reasons for asking for a change of exam date.
Documented SFU commitments on the exam date.

<u>Invalid reasons</u> for asking for a change of exam date.
Other plans, e.g., travel, work, getting married.

Students With Special Needs

I advise students who require accommodations in this course due to a disability affecting mobility, vision, hearing, learning, or mental or physical health to discuss their needs with The Centre for Students with Disabilities, 778-782-3112 (Phone) or https://www.sfu.ca/students/disabilityaccess.html.

Plagiarism

Plagiarism is a serious academic offence, and will not be tolerated in this course. SFU's Code of Academic Policy (http://www.sfu.ca/policies/gazette/student/s10-01.html) states that:

"Plagiarism is a form of academic dishonesty in which an individual submits or presents the work of another person as his or her own. Scholarship quite properly rests upon examining and referring to the thoughts and writings of others. However, when excerpts are used in paragraphs or essays, the author must be acknowledged using an accepted format for the underlying discipline. Footnotes, endnotes, references and bibliographies must be complete…
Plagiarism exists when all or part of an essay is copied from an author, or composed by another person, and presented as original work. Plagiarism also exists when there is inadequate recognition given to the author for phrases, sentences, or ideas of the author incorporated into an essay.
A draft paper, proposal, thesis or other assignment may be subject to penalty for academic dishonesty provided the instructor/supervisor has informed the student(s) before the work is submitted…
Penalties imposed by the University for academic dishonesty may include but are not limited to one or more of the following: a warning, a verbal or written reprimand, reassessment of work, failure on a particular assignment, failure in a course, denial of admission or readmission to the University, deregistration, forfeiture of University awards or financial assistance, suspension or permanent suspension from the University or revocation of a degree."