School of Computer Science

COMP3308/COMP3608 Introduction to Artificial Intelligence (regular and advanced)

semester 1, 2021

Unit coordinator and lecturer: Irena Koprinska (irena.koprinska@sydney.edu.au)

Course web site on Canvas: https://canvas.sydney.edu.au/login/canvas (login with your unikey)

Welcome to COMP3308/3608 Artificial Intelligence!

Artificial Intelligence (AI) is all about programming computers to perform tasks normally associated with intelligent behaviour. Classical AI programs have played games, proved theorems, discovered patterns in data, planned complex assembly sequences and so on. This unit of study will introduce representations, techniques and architectures used to build intelligent systems. It will explore selected topics such as heuristic search, game playing, machine learning, neural networks and probabilistic reasoning. Students who complete this unit will have an understanding of some of the fundamental methods and algorithms of AI, and an appreciation of how these methods and algorithms can be applied to interesting problems. The unit will involve a practical component in which some simple problems are solved using AI techniques.

There are two streams: COMP3308 (regular) and COMP3608 (advanced). They share the same lectures, but have different tutorials and assessment. COMP3608 covers all the material of COMP3308, plus some extra topics, and also has more challenging assessments.

We hope that you will find this course interesting and useful!

Learning outcomes

At the completion of this unit, a student should be able to:

- Formulate problem space description, select and apply suitable search algorithms (brute-force and heuristic) and analyse the issues involved
- Understand and apply minimax search and alpha-beta pruning in game playing
- Understand the basic principles and analyse the strengths, weaknesses and applicability of some of the main AI algorithms for supervised learning, unsupervised learning and probabilistic reasoning
- Gain practical experience in designing, implementing and evaluating AI algorithms
- Present and interpret data and information in verbal and written form
- Appreciate some of the main ideas and views in AI, achievements and shortcomings of AI and the links between AI and other Computer Science areas

1. Teaching team

Unit of study coordinator and lecturer

Associate Professor Irena Koprinska, irena.koprinska@sydney.edu.au
Office: Computer Science Building, level 4, room 450

Teaching assistants

Jessica McBroom, jmcb6755@uni.sydney.edu.au

Givanna Putri, ghar1821@uni.sydney.edu.au (PASTA)

Tutors

Jessica McBroom, jmcb6755@uni.sydney.edu.au	James Wood, jwoo5427@uni.sydney.edu.au
Stephen McCloskey, smcc7913@uni.sydney.edu.au	Sophia Polito, spol5736@uni.sydney.edu.au
Nicholas Rhodes, nrho8098@uni.sydney.edu.au	Cameron Eggins, cegg2014@uni.sydney.edu.au
Christopher Irving, cirv4240@uni.sydney.edu.au	

How to contact us

If you have questions about the course content, post them on the discussion board PIAZZA, assessable via Canvas. This is the fastest way to get a response from the teaching team or your classmates, almost in real time! You can post your questions anonymously or not anonymously.

2. Timetable

All teaching for this course will be online, there are no face-to-face classes.

Lectures (start in week 1): Monday 10-12noon. The lectures will be pre-recorded and available on Canvas to watch during the lecture time. You can access them from "Recorded Lectures".

Tutorials (start in week 2): All tutorials will be online, live-streamed via Zoom. One tutorial will be recorded every week and made available on Canvas in "Recorded Lectures" Please attend your allocated tutorial; if there are issues with Zoom, you can attend another one.

Tutorial	**Time**	**Tutor**		**Tutorial**	**Time**	**Tutor**
COMP3308				COMP3608		
1 (T16)	Tuesday 16-17	Cameron		1 (W15)	Wednesday 15-16	Jessica
2 (T17)	Tuesday 16-17	Cameron		2 (W16)	Wednesday 16-17	Jessica
3 (W10A)	Wednesday 10-11	James				
4 (W10B)	Wednesday 10-11	Stephen				
5 (W11A)	Wednesday 11-12	James				
6 (W11B)	Wednesday 11-12	Stephen				
7 (W13A)	Wednesday 13-14	Christopher				
8 (W13B)	Wednesday 13-14	Stephen				
9 (W14A)	Wednesday 14-15	Sophia				
10 (W14B)	Wednesday 14-15	Christopher				
11 (W15A)	Wednesday 15-16	Sophia				
12 (W15B)	Wednesday 15-16	Nicholas				
13 (W16)	Wednesday 16-17	Nicholas				
14 (W17)	Wednesday 17-18	Nicholas				

3. Course website

The main place for this course is the Canvas COMP3308/3608 website, accessible from: https://canvas.sydney.edu.au/login/canvas

We will use it for all teaching materials (lecture slides, tutorial notes and tutorial solutions), assignment specifications, submission of the weekly homeworks and posting of your marks.

In addition to Canvas, we will also use the discussion board Piazza and the autograding system PASTA. They will be linked to Canvas.

4. Weekly schedule

Week	Date	Topic	Homework
1	1 March	Introduction: administrative matters and course overview; what is AI, history and state of the art.	No No tutorial
2	8 March	Problem solving and search. Uninformed search: BFS, UCS, DFS and IDS. Informed search 1 – greedy best-first.	Yes
3	15 March	Informed search 2: A* Local search: hill-climbing, beam, simulated annealing, genetic algorithms. Assignment 1 out: Friday	Yes
4	22 March	Game playing: game playing as search; deterministic, perfect information, 0-sum games: minimax, alpha-beta pruning; non-deterministic games.	Yes
5	29 March	Introduction to machine learning. Instance-based learning. Rule-based methods.	Yes
		Mid-semester break	
6	12 April	Statistical-based learning. Evaluating and comparing classifiers. Assignment 1 due: Friday 11.59pm	Yes
7	19 April	Decision trees. Assignment 2 out: Monday	Yes
8	26 April	Introduction to neural networks. Perceptrons. Multilayer neural networks 1.	Yes
9	3 May	Multilayer neural networks 2. Deep learning	Yes
10	10 May	Support vector machines. Ensembles of classifiers. Assignment 2 due: Friday 11.59pm	Yes
11	17 May	Probabilistic reasoning. Bayesian networks and inference in them.	Yes
12	24 May	Unsupervised learning.	Yes
13	31 May	Applications of AI. Revision and preparation for the exam.	No

5. Assessment overview

Component	Due date and submission	Notes
Weekly Homeworks Weight: 4%	Tuesday 4pm, every week, except weeks 1 and 13 Individual Submitted in Canvas No late submissions are allowed. The Canvas submission box will close at 4pm exactly, so submit earlier to avoid last minute problems.	Every week you are required to submit a homework using the submission box in Canvas before the tutorial classes. Exception: there is no homework in w1 (no tutorial) and w13 (last week of semester). The homeworks for **all** students are due at 4pm on Tuesday (i.e. before the first COMP3308/3608 tutorial class), regardless of when your tutorial class is. This is fair as all students will have the same time to complete the homework. This is also the maximum possible time as the correct answers will be discussed at the tutorials, and thus will be effectively available on Tuesday 4pm. The homeworks are due in the current week, not the week after (as their goal is to prepare you for the tutorial), e.g. the homework for week 2 is due on Tuesday week 2, the homework for week 3 is due on Tuesday week 3, etc. The homework exercises (typically 1 exercise) are clearly marked in the tutorial notes that you can download from Canvas. They are the same for both COMP3308 and COMP3608, unless otherwise specified. The homework exercises are easy and require direct application of the material covered in the lectures in the current week. Their aim is to prepare you for the tutorial and also to encourage steady learning during the semester. We will mark only 4 homeworks from the 11 homeworks that you will submit during the semester, for 1 mark each. These 4 homeworks will be randomly chosen but will be the same for all students. In week 13 we will inform you which homeworks were chosen for marking and we will also post the marks on Canvas.
Assignment 1 Weight: 12%	Friday week 6, 11.59pm Individual Submitted in PASTA Late submissions: Late submissions are allowed up to 3 days late. A penalty of	Given a problem, you will be required to apply one or more AI algorithms to solve it. This will include writing a computer program to solve the problem - you can use a language of your choice: Python, Java, C, C++ or Matlab.

	5% per day late will apply. Assignments more than 3 days late will not be accepted (i.e. will get 0). Exception: No late submissions are allowed for one of the components of the COMP3608 assignment – see the assignment specification.	
Assignment 2 Weight: 24%	Friday week 10, 11.59pm Individual or in pairs (no more than 2 people). We encourage working in pairs. You can pair with a student from your or another tutorial. Submitted in PASTA (code+report). Report also submitted in Canvas for checking by TurnItIn. Late submissions: late submissions are allowed up to 3 days late. A penalty of 5% per day late will apply. Assignments more than 3 days late will not be accepted (i.e. will get 0).	As in Assignment 1, but in addition to the computer program, you need also to submit a report describing how you solved the problem and discussing the strengths and weaknesses of your solution. Assignments 1 and 2 will be posted on Canvas with information how to submit them in PASTA.
Exam Weight: 60% Online, take- home Not-proctored	During the exam period Individual Exam duration: 2 hours	During exam period. At least 40% on the exam is required to pass the course. Information about the exam and a sample exam paper will be available in week 13.

Special considerations: If you experience short-term circumstances beyond your control, such as illness, injury or misadventure, which affect your preparation or performance in an assessment, you may apply for special consideration. There is a centralised University system; all applications are submitted online after login to "myUni" and are processed by the Student Administration Services unit.

Important: You are required to submit your special consideration application form within 3 working days from the date when the assessment was due. For more information see: http://sydney.edu.au/special-consideration

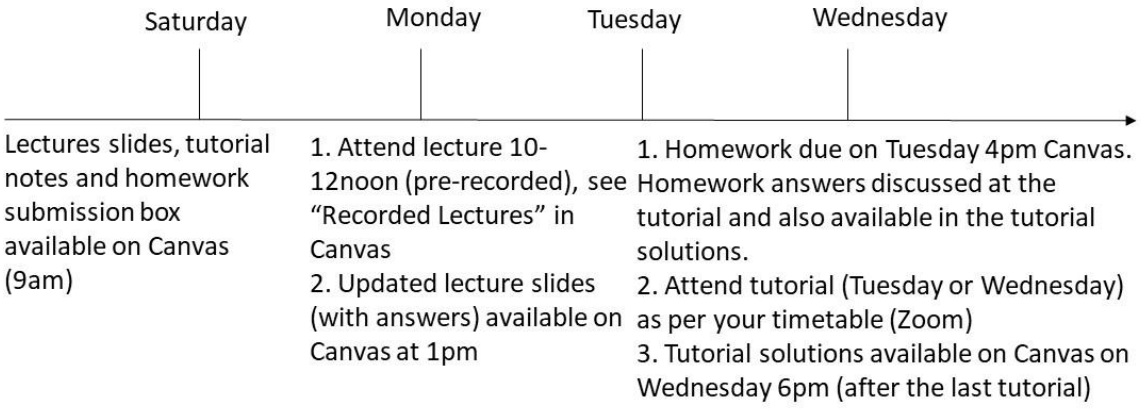
Passing this unit of study: The School of Computer Science has the following policy: To pass a unit of study, a student must achieve at least 40% in the written exam. A student must also achieve an overall final mark of 50 or more in order to pass a unit of study.

6. Availability of teaching materials

The course materials (lecture slides, tutorial notes and homework submission box) will be available every week in advance on Saturday morning on Canvas. For example, the materials for week 2 will be available on Saturday 9am in week 1.

The lecture slides initially will not include the answers to all questions and exercises that we will do during the lecture; the complete version with the answers will be uploaded after the lecture (available at 1pm on Monday).

The tutorial solutions will be available on Canvas on Wednesday 6pm. This is after the last tutorial on Wednesday which finishes at 5pm.



7. Academic honesty

All cases of plagiarism and academic dishonesty will be investigated. There is a new process and a centralized University system and database. Please read the University Policy on Academic Honesty carefully: http://sydney.edu.au/elearning/student/EI/academic_honesty.shtml

Please note that:

- If you copy from another student, website or other source, you have committed an act of **plagiarism.** This includes copying the whole assignment or only a part of it.
- If you make your work available to another student to copy, you have committed an act of **academic dishonesty**
- If you engage another person to complete your assignment (or a part of it), for payment or not, you have committed an act of **academic misconduct.** Your case will be forwarded to the University Registrar for investigation which is very serious.

The penalties for academic dishonesty, plagiarism and misconduct are severe and include: 1) a permanent record of academic dishonesty, plagiarism and misconduct in the University database and your student file, 2) mark deduction which varies from 0 marks for the assessment component to fail for the whole course, 3) expulsion from the University and cancelling of your student visa.

To detect plagiarism in reports (Assignment 2 report part), we will use TurnItIn, which is linked to Canvas.

To detect plagiarism in programming code we will use the similarity detection system MOSS. MOSS is designed especially for detecting plagiarism in programming code. We will compare your programming

assessments with these of other students (current and previous) and the Internet. MOSS is an extremely good system – it cannot be fooled by changing the variable names or the order of the conditions in `if` statements.

Below are some cases of plagiarism and academic dishonesty that we have seen in our school, together with the student excuses. Please note that both parties are penalized - the student who copies and the student who makes his/her work available for copying.

- *I sat the test and then posted the questions and solutions to my friends whose test was later in the week. I only wanted to help them understand the concepts that are examinable.*
- *I posted parts of my code on my web page (or the group discussion forum) because my solution was cool (or I wanted to help them). I didn't expect them to copy it.*
- *I tried to do the assignment on my own but I had problems with the extension part that I couldn't fix, so I submitted my core part and his extension part. I didn't cheat.*
- *I finished my assignment but my friend had family problems. I felt sorry for her, so I gave her my assignment as an example. She said she only wanted to have a look and promised not to copy it.*
- *The test has finished but the tutor hasn't collected the papers yet. I showed my answer to my friend. I didn't expect him to copy it.*
- *He is my best friend. I had no choice but to let him copy.*
- *I couldn't find a partner to work in pairs, so I joined their pair as they are my friends* (when only groups of maximum of 2 students are allowed).

Please do not confuse legitimate cooperation with cheating. In individual assignments, you can discuss the assignment with another student, this is a legitimate collaboration, but you cannot complete the assignment together – everyone must write their own code and report.

Important: If someone asks you to see or copy your assignment, or to complete the assignment instead of them, just say: *I can't do this. This is against the University policy. I will not risk my reputation and future by doing this.* Be smart and don't risk your future by engaging in plagiarism and academic dishonesty!

8. Textbooks

Textbook

S. J. Russell and P. Norvig
Artificial Intelligence - A Modern Approach, 4th edition
Pearson, 2020
(You can also use the 3rd edition)

Recommended book

Ian H. Witten, Eibe Frank, Mark Hall and Christopher J. Pal
Data Mining - Practical Machine Learning Tools and Techniques, 4th edition
Morgan Kaufmann, 2017
(You can also use the 3rd edition)