



## COS30019 Unit Outline Sem 1 2024

Introduction to Artificial Intelligence (Swinburne University of Technology)



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# Unit Outline

**COS30019**

## Introduction to Artificial Intelligence

Semester 1 2024

**Please read this Unit Outline carefully. It includes:**

- PART A** Unit summary
- PART B** Your Unit in more detail
- PART C** Further information



## PART A: Unit Summary

<b>Unit Code(s)</b>	COS30019
<b>Unit Title</b>	Introduction to Artificial Intelligence
<b>Duration</b>	One semester or equivalent
<b>Total Contact Hours</b>	48 hours
<b>Requisites:</b>	
<b>Pre-requisites</b>	COS20007 Object Oriented Programming OR COS30008 Data Structures and Patterns
<b>Co-requisites</b>	Nil
<b>Concurrent pre-requisites</b>	Nil
<b>Anti-requisites</b>	Nil
<b>Assumed knowledge</b>	Object oriented programming at an intermediate level
<b>Credit Points</b>	12.5 credit points
<b>Campus/Location</b>	Hawthorn
<b>Mode of Delivery</b>	Live Online AND Face to Face
<b>Assessment Summary</b>	Assignment 1 (Individual) 30% Assignment 2 (Group) 20% Mid-Semester Test (Individual) 25% Final Assessment Questionnaire (Individual) 25%

### Aims

This unit is designed to give students a broad outline of algorithmic problem solving and the basic concepts of artificial intelligence. It is assumed that students already have good programming skills in at least one of the programming languages Python/Java/C#/C++.

### Unit Learning Outcomes

Students who successfully complete this unit can:

1. Describe and interpret the fundamental concepts of Artificial Intelligence (AI) and generic problem-solving techniques
2. Apply advanced algorithms and data structures to solve common problems
3. Design software that implements AI concepts

## Graduate Attributes

The Swinburne Graduate Attributes describe the capability of our graduates to use knowledge, skills and behaviours to contribute to society meaningfully and positively. They include professional, self-directed learning and future-ready skills.

This unit contributes to the development of the following Swinburne Graduate Attributes:

- *GA2 Communication - Communicating using different media:* Students are required to write reports (for the assignments) to discuss their understanding of the problems as well as their approaches for solving the problems. They are also required to provide comments to explain their code.
- *GA3 Teamwork - Collaboration and negotiation:* Students are required to work within a team for Assignment 2.
- *GA5 Digital literacies– Information literacy:* Students are required to perform research on the Internet to learn about algorithms and how to implement them to fulfil the requirements of the Assignments.
- *GA6 Digital Literacies– Technical literacy:* Students are required to use a programming language (e.g., Python) to implement algorithms learned from this unit and deliver a working software.

Other graduate attributes may be practised in the unit but are not formally taught as part of the unit content, nor incorporated within formal assessment:

- *GA1 Communication - Verbal communication.*
- *GA4 Teamwork – Teamwork roles and processes.*

## Content

- Introduction to Artificial Intelligence and Intelligent Agents
- Uninformed and Informed Search
- Knowledge Representation
- Introduction to Logic and Reasoning
- Expert Systems
- AI Planning
- Uncertain Knowledge and Reasoning
- Decision Making with Uncertainty
- Adaptation and Machine Learning
- Philosophical Aspects of AI

## PART B: Your Unit in more detail

### Unit Improvements

Feedback provided by previous students through the Student Survey has resulted in improvements that have been made to this unit. Recent improvements include:

- More programming practicals have been introduced into the weekly tutorials;
- The Final Exam has been structured into two separate assessments: Mid-term Test (25%) and Final Assessment (25%).

### Unit Teaching Staff

Name	Role	Room	Phone	Email	Consultation Times
Bao Quoc Vo	Unit Convenor	EN514a	9214 4756	<a href="mailto:bvo@swin.edu.au">bvo@swin.edu.au</a>	By appointment
Hy Nguyen	Tutor			<a href="mailto:hynguyen@swin.edu.au">hynguyen@swin.edu.au</a>	By appointment
Ru Jia	Tutor			<a href="mailto:rjia@swin.edu.au">rjia@swin.edu.au</a>	By appointment
Mohammad Abuhassan	Tutor			<a href="mailto:mabuhassan@swin.edu.au">mabuhassan@swin.edu.au</a>	By appointment

### Learning and Teaching Structure

Category	Activity	Total Hours	Hours per Week	Teaching Period Weeks
In person /Live Online	Lectures	24 hours	2 hours	Weeks 1 to 12
In person	Class	24 hours	2 hour	Weeks 1 to 12
Online	Self-paced learning activities	102 hours	8.5 hours	Weeks 1 to 12

### Week by Week Schedule

Week	Week Beginning	Teaching and Learning Activity	Student Task or Assessment
1	February 26	<b>Lecture:</b> Introduction & the foundations of AI <b>Online materials:</b> Introduction & the foundations of AI <b>Tutorial:</b> The foundations of AI	Introduction & the foundations of AI - <b>online discussion</b>  <b>Readings</b> <Textbook Chapter 1 >
2	March 4	<b>Lecture:</b> Intelligent Agents <b>Online materials:</b> Intelligent Agents	Intelligent Agents

			<b>Readings</b> <Chapter 2 >
3	March 11	<b>Lecture:</b> Search – Uninformed <b>Online materials:</b> Search - Uninformed <b>Tutorial:</b> Search – Uninformed	Search - Uninformed  Search – Informed and Uninformed – <b>Assignment 1 released</b> <b>Readings</b> <Chapter 3 >
4	March 18	<b>Lecture:</b> Search – Informed <b>Online materials:</b> Search - Informed <b>Tutorial:</b> Search – Informed	Search – Informed  <b>Readings</b> <Chapters 3 & 4 >
5	March 25	<b>Lecture:</b> Adversarial Search <b>Online materials:</b> Adversarial Search <b>Tutorial:</b> Adversarial Search	Adversarial Search  <b>Readings</b> <Chapter 5>
<b>Break</b>	April 1	<b>Mid-Semester/Easter Break</b> Thursday 28 March to Wednesday 3 April (inclusive)	No class
6	April 8	<b>Lecture:</b> Logic & Knowledge Representation <b>Online materials:</b> Logic & Knowledge Representation <b>Tutorial:</b> Logic & Knowledge Representation	Logic & Knowledge Representation  <b>Readings</b> <Chapter 7>
7	April 15	<b>Lecture:</b> Propositional Logic <b>Online materials:</b> Propositional Logic <b>Tutorial:</b> Propositional Logic	Propositional Logic Search – Informed and Uninformed – <b>Assignment 1 submission</b>  <b>Mid-Semester Test</b> <b>Readings</b> <Chapters 7> Propositional Logic – <b>Assignment 2 released</b>
8	April 22	<b>Lecture:</b> First-Order Logic <b>Online materials:</b> First-Order Logic <b>Tutorial:</b> First-Order Logic	First-Order Logic  <b>Readings</b> <Chapters 8&9>
9	April 29	<b>Lecture:</b> Planning <b>Online materials:</b> Planning <b>Tutorial:</b> Planning	Planning  <b>Readings</b> <Chapter 10>
10	May 6	<b>Lecture:</b> Probabilistic Reasoning and Bayesian Networks <b>Online materials:</b> Probabilistic Reasoning and Bayesian Networks <b>Tutorial:</b> Probabilistic Reasoning and Bayesian Networks	Probabilistic Reasoning and Bayesian Networks  <b>Readings</b> <Chapters 13& 14>
11	May 13	<b>Lecture: Machine Learning and Adaptation</b>	Machine Learning and Adaptation - online discussion

		<b>Online materials: Machine Learning and Adaptation</b> <b>Tutorial: Machine Learning and Adaptation</b>	Readings <Chapters 18 & 19>
12	May 22	<b>Lecture: Summary and Review</b> <b>Online materials: Summary and review</b> <b>Tutorial: Reviews of tutorial material &amp; Practice exam questions</b>	<b>Propositional Logic – Assignment 2 submission</b>
	May 29 – June 16	<b>Exam Period</b>	<b>Final Assessment Questionnaire</b> (to be announced by the university)

## Assessment

### a) Assessment Overview

Tasks and Details	Individual or Group	Weighting	Mapped Unit Learning Outcomes	Mapped Graduate Attributes	Assessment Due Date
1. Assignment 1	Individual	30%	2, 3	End of Week 7	1. Assignment 1
2. Assignment 2	Group	20%	2, 3	End of Week 12	2. Assignment 2
3. Mid-Semester Test	Individual	25%	1,2	Week 7	3. Mid-Semester Test
4. Final Assessment Questionnaire	Individual	25%	1,2	Formal Exam Period	4. Final Assessment Questionnaire

### b) Minimum requirements to pass this unit

To pass this unit, you must achieve an overall mark for the unit of 50% or more.

**Note: There are no hurdles in this unit.**

### c) Final Assessment Period

If the unit you are enrolled in has a final assessment (including invigilated exams), you will be expected to be available for the entire final assessment period including any Special Exam period.

### d) Submission Requirements

- The programming assignments will be submitted via the ESP system provided by the university CSO (at <https://esp.swin.edu.au/>).
- Submission details will be provided on the subject Canvas site.

- Please ensure you keep a copy of all assessments that are submitted.

Other assessments are generally submitted online through the Canvas assessment submission system which integrates with the Turnitin plagiarism checking service.

Please ensure you keep a copy of all assessments that are submitted.

In cases where a hard copy submission is required an Assessment Cover Sheet must be submitted with your assignment. The standard Assessment Cover Sheet is available from the [Submitting work](http://www.swinburne.edu.au/studentforms/) webpage or [www.swinburne.edu.au/studentforms/](http://www.swinburne.edu.au/studentforms/)

#### e) Extensions and Late Submission

Late Submissions - Unless an extension has been approved, late submissions will result in a penalty. You will be penalised 10% of your achieved mark for each working day the task is late, up to a maximum of 5 working days. After 5 working days, a zero result will be recorded.

#### f) Referencing

To avoid breaching academic integrity, you are required to provide references whenever you include information from other sources in your work and acknowledge when you have used Artificial Intelligence (AI) tools (such as ChatGPT). Further details regarding academic integrity are available in Section C of this document.

Referencing conventions required for this unit are:

**Anderson, J. & Poole, M. (2001).** *Assignment and thesis writing 4<sup>th</sup> Edn.* Brisbane: John Wiley & Sons

Helpful information on referencing can be found at <http://www.swinburne.edu.au/library/referencing/>

#### g) Groupwork Guidelines

A group assignment is the collective responsibility of the entire group, and if one member is temporarily unable to contribute, the group should be able to reallocate responsibilities to keep to schedule. In the event of longer-term illness or other serious problems involving a member of group, it is the responsibility of the other members to notify immediately the Unit Convenor or relevant tutor.

Group submissions must be submitted with an Assignment Cover Sheet, signed by all members of the group.

All group members must be satisfied that the work has been correctly submitted. Any penalties for late submission will generally apply to all group members, not just the person who submitted.

If a member of a group receives an extension or special consideration, this does not apply to all other members of the group. Students will need to discuss with relevant teaching staff when this scenario arises.



## Required Textbook(s)

The required textbook(s) are available through the Swinburne Library or can be purchased from bookshops.

### Course Notes:

**Lecture Notes, 2024** (Available from the subject website during the teaching period)

### Text Book:

Russell, S.J. and Norvig, P., "**Artificial Intelligence: A Modern Approach**," 3rd edition, Prentice-Hall, 2010, OR 4th edition, Pearson Education Limited, 2022.

## Recommended Reading Materials

The Library has a large collection of resource materials. Listed below are some references that will provide valuable supplementary information to this unit. It is also recommended that you explore other sources to broaden your understanding.

- B. Coppin, "Artificial Intelligence Illuminated" Jones and Bartlett Publishers, 2004
- Nilsson, "Artificial Intelligence: A New Synthesis" Morgan Kaufman Pub. 1998

## PART C: FURTHER INFORMATION



For further information on any of these topics, refer to Swinburne's Student webpage <http://www.swinburne.edu.au/student/>

### **Student behaviour and wellbeing**

All students are expected to: act with integrity, honesty and fairness; be inclusive, ethical and respectful of others; and appropriately use University resources, information, equipment and facilities. All students are expected to contribute to creating a work and study environment that is safe and free from bullying, violence, discrimination, sexual harassment, vilification and other forms of unacceptable behaviour.

The [Student Charter](#) describes what students can reasonably expect from Swinburne in order to enjoy a quality learning experience. The Charter also sets out what is expected of students with regards to your studies and the way you conduct yourself towards other people and property.

You are expected to familiarise yourself with University regulations and policies and are obliged to abide by these, including the [Student Academic Misconduct Regulations](#), [Student General Misconduct Regulations](#) and the [People, Culture and Integrity Policy](#). Any student found to be in breach of these may be subject to disciplinary processes.

Examples of expected behaviours are:

- conducting yourself in teaching areas in a manner that is professional and not disruptive to others
- following specific safety procedures in Swinburne laboratories, such as wearing appropriate footwear and safety equipment, not acting in a manner which is dangerous or disruptive (e.g. playing computer games), and not bringing in food or drink
- following emergency and evacuation procedures and following instructions given by staff/wardens in an emergency response

### **Canvas**

You should regularly log on to the Swinburne learning management system, Canvas. You can access Canvas via the [Student login](#) webpage or <https://swinburne.instructure.com/>. Canvas is updated regularly with important unit information and communications.

### **Communication**

All communication will be via your Swinburne email address. If you access your email through a provider other than Swinburne, then it is your responsibility to ensure that your Swinburne email is redirected to your private email address.

### **Academic Integrity**

Academic integrity is about taking responsibility for your learning and submitting work that is honestly your own. It means acknowledging the ideas, contributions and work of others; referencing your sources and acknowledging the use of artificial intelligence tools (such as ChatGPT, DALLÉ, Midjourney); contributing fairly to group work; and completing tasks, tests and exams without cheating. Artificial intelligence tools should only be used where approved by the Unit Convenor.

Swinburne University uses the Turnitin system, which helps to identify inadequate citations, poor paraphrasing and unoriginal work in assignments that are submitted via Canvas. Your Unit Convenor will provide further details.

Plagiarising, cheating and seeking an unfair advantage in a test, exam or assessment task are all breaches of academic integrity and treated as academic misconduct. Examples of breaches of academic integrity include:

- using the whole or part of computer program written by another person as your own without appropriate acknowledgement
- copying the whole or part of somebody else's work in an assessment, including material from a published work, a website or database, a set of lecture notes, current or past student's work, or any other person's work
- using output from artificial intelligence tools (e.g. ChatGPT) in whole or part without acknowledgement and/or without the approval of the Unit Convenor
- poorly paraphrasing somebody else's work
- using a musical composition or audio, visual, graphic and photographic work created by another without acknowledgment
- using objects, artefacts, costumes or models created by another person and presenting them as your own
- submitting assessments that have been developed by another person or service (paid or unpaid), referred to as contract cheating
- presenting or submitting assignments or other work in conjunction with another person or group of people when that work should be your own independent work.
- enabling others to cheat, including letting another student copy your work or by giving access to a draft or completed assignment.

The penalties for academic misconduct can be severe, ranging from a zero grade for an assessment task through to exclusion from Swinburne.

For further details, see <https://www.swinburne.edu.au/student-login/academic-integrity/>

### **Student support**

Swinburne offers a range of services and resources to help you complete your studies successfully. Your Unit Convenor or studentHQ can provide information about the study support and other services available for Swinburne students. See <https://www.swinburne.edu.au/life-at-swinburne/student-support-services/> for further information.

### **Special consideration**

If your studies have been adversely affected due to serious and unavoidable circumstances outside of your control (e.g. severe illness or unavoidable obligation), you may be able to apply for special consideration (SPC).

Applications for Special Consideration are submitted via the SPC online tool normally no later than 5.00pm on the third working day after the submission/sitting date for the relevant assessment component. See <https://www.swinburne.edu.au/life-at-swinburne/student-support-services/special-consideration-assistance/>

### **Accessibility needs**

Sometimes students with a disability, a mental health or medical condition or significant carer responsibilities require reasonable adjustments to fully access and participate in education. Swinburne's AccessAbility Services can develop an 'Education Access Plan' that includes the

services and reasonable adjustments that you need. The plan makes recommendations to University teaching and examination staff.

It is recommended that you register with AccessAbility Services within one week after the commencement of your unit to allow the University to make reasonable adjustments.

### **Review of marks**

An independent marker reviews all fail grades for major assessment tasks. In addition, a review of assessment is undertaken if your final result is between 45 and 49 or within 2 marks of any grade threshold.

You can ask the Unit Convenor to check the result for an assessment item or your final result. Your request must be made in writing within 10 working days of receiving the result. The Unit Convenor can discuss the marking criteria with you and check the aggregate marks of assessment components to identify if an error has been made. This is known as local resolution.

If you are dissatisfied with the outcome of the local resolution, you can lodge a formal complaint.

### **Feedback, complaints and suggestions**

In the first instance, discuss any issues with your Unit Convenor. If your concerns are not resolved or you would prefer not to deal with your Unit Convenor, then you can complete a feedback form.

See <https://www.swinburne.edu.au/corporate/feedback/>

### **Advocacy**

If you require assistance with any academic issues, University statutes, regulations, policies and procedures, you are advised to seek advice from an Independent Advocacy Officer at Swinburne Student Life. Talking to an Advocacy Officer is free, independent and confidential.

For more information and booking an appointment, please see <https://www.swinburne.edu.au/current-students/student-services-support/advocacy/>