**School of Science, Computing and Engineering Technologies**
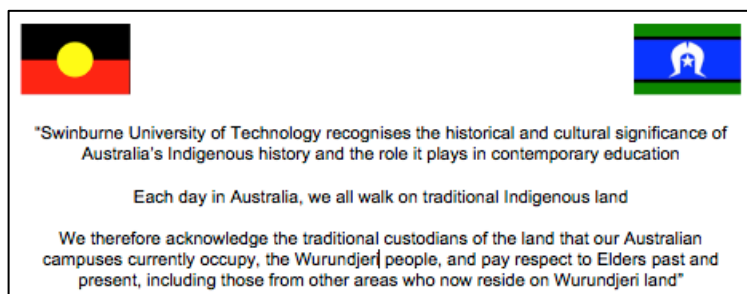
# Unit Outline

## COS30019

## Introduction to Artificial Intelligence

Semester 1 2023

**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

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

This unit may contribute to the development of the following Swinburne Graduate Attributes:

- Communication 1 - Verbal communication
- Communication 2 - Communicating using different media
- Teamwork 1 - Collaboration and negotiation
- Teamwork 2 - Teamwork roles and processes

- Digital literacies 1 – Information literacy
- Digital Literacies 2 – Technical literacy

## Content

- Introduction to Artificial Intelligence and Intelligent Agents
- Introduction to Logic and Reasoning
- Uninformed and Informed Search
- Knowledge Representation
- 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:

- The weight for Assignment 1 has been increased (from 20% to 30%) to better reflect the effort required to complete it.
- The Final Exam has been structured into two separate assessments: Mid-term Test (25%) and Final Exam (25%)

## Unit Teaching Staff

| Name | Role | Room | Phone | Email | Consultation Tin |
|------|------|------|-------|-------|------------------|
| Bao Quoc Vo | Unit Convenor | EN514a | 9214 4756 | bvo@swin.edu.au | By appointment |
| Hy Nguyen | Tutor | | | hynguyen@swin.edu.au | By appointment |
| Anika Kanwal | Tutor | | | akanwal@swin.edu.au | By appointment |

## Learning and Teaching Structure

| Category | Activity | Total Hours | Hours per Week | Teaching Period Weeks |
|----------|----------|-------------|----------------|------------------------|
| Live Online | Lectures | 24 hours | 2 hour | Weeks 1 to 12 |
| In person | Tutorial | 24 hours | 2 hours | 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 27 | **Lecture:** Introduction & the foundations of AI<br><br>**Online materials:** Introduction & the foundations of AI<br>**Tutorial:** The foundations of AI | Introduction & the foundations of AI - **online discussion**<br><br>**Readings** <**Textbook** Chapter 1 > |
| 2 | March 6 | **Lecture:** Intelligent Agents<br>**Online materials:** Intelligent Agents | Intelligent Agents<br><br>**Readings** <Chapter 2 > |
| 3 | March 13 | **Lecture:** Search – Uninformed<br>**Online materials:** Search - Uninformed | Search - Uninformed |

| | | Tutorial: Search – Uninformed | Search – Informed and Uninformed – **Assignment 1 released**<br><br>**Readings** <Chapter 3 > |
|---|---|---|---|
| 4 | March 20 | **Lecture:** Search – Informed<br>**Online materials:** Search - Informed<br>**Tutorial:** Search – Informed | Search – Informed<br><br>**Readings** <Chapters 3 & 4 > |
| 5 | March 27 | **Lecture:** Adversarial Search<br><br>**Online materials:** Adversarial Search<br><br>**Tutorial:** Adversarial Search | Adversarial Search<br><br>**Readings** <Chapter 5> |
| 6 | April 3 | **Lecture:** Logic & Knowledge Representation<br><br>**Online materials:** Logic & Knowledge Representation<br><br>**Tutorial:** Logic & Knowledge Representation | Logic & Knowledge Representation<br><br>**Readings** <Chapter 7> |
| break | April 10 | **Mid-Semester Break/Easter** Thursday **6 April** to Wednesday **12 April (inclusive)** | |
| 7 | April 17 | **Lecture:** Propositional Logic<br><br>**Online materials:** Propositional Logic<br><br>**Tutorial:** Propositional Logic | Propositional Logic<br>Search – Informed and Uninformed – **Assignment 1 submission**<br><br>Mid-Semester Test<br>**Readings** <Chapters 7><br>Propositional Logic – **Assignment 2 released** |
| 8 | April 24 | **Lecture:** First-Order Logic<br><br>**Online materials:** First-Order Logic<br><br>**Tutorial:** First-Order Logic | First-Order Logic<br><br>**Readings** <Chapters 8&9> |
| 9 | May 1 | **Lecture:** Planning<br><br>**Online materials:** Planning<br>**Tutorial:** Planning | Planning<br><br>**Readings** <Chapter 10> |
| 10 | May 8 | **Lecture:** Probabilistic Reasoning and Bayesian Networks<br><br>**Online materials:** Probabilistic Reasoning and Bayesian Networks<br><br>**Tutorial:** Probabilistic Reasoning and Bayesian Networks | Probabilistic Reasoning and Bayesian Networks<br><br>**Readings** <Chapters 13& 14> |
| 11 | May 15 | **Lecture: Machine Learning and Adaptation**<br><br>**Online materials: Machine Learning and Adaptation** | Machine Learning and Adaptation - online discussion<br>Readings <Chapters 18 & 19> |

| | | Tutorial: Machine Learning and Adaptation | |
|---|---|---|---|
| 12 | May 22 | **Lecture: Summary and Review**<br><br>**Online materials: Summary and review**<br><br>**Tutorial: Reviews of tutorial material & Practice exam questions** | **Propositional Logic – Assignment 2 submission** |
| | May 29 – June 16 | **Exam Period** | **Final Assessment Questionnaire** (to be announced by the university) |

## Assessment

### a)   Assessment Overview

<span style="color:green">[List assessment tasks.  These must be consistent with the accredited Unit Details in Atlas]</span>

| Tasks and Details | Individual or Group | Weighting | Unit Learning Outcomes that this assessment task relates to | Assessment Due Date |
|---|---|---|---|---|
| 1. Assignment 1 | Individual | 30% | 2, 3 | End of Week 7 |
| 2. Assignment 2 | Group | 20% | 2, 3 | End of Week 12 |
| 3. Mid-Semester Test | Individual | 25% | 1,2 | Week 7 |
| 4. Final Assessment Questionnaire | Individual | 25% | 1,2 | Formal Exam Period |

### 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)   Examinations

If the unit you are enrolled in has an official examination, you will be expected to be available for the entire examination 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.
- An Assessment Cover Sheet must be submitted with your assignment.  The standard Assessment Cover Sheet is available from the Current Students web site (see Part C).

### 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 plagiarism, you are required to provide a reference whenever you include information from other sources in your work. Further details regarding plagiarism are available in Section C of this document.

Referencing conventions required for this unit are:

**Anderson, J. & Poole, M. (2001)**. *Assignment and thesis writing 4th 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 immediately notify 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.

## Required Textbook(s)

The required textbook(s) are available from Swinburne Bookshop:
http://bookshop.swin.edu.au

**Course Notes:**
   **Lecture Notes, 2023** (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.

## Recommended Reading Materials

The Library has a large collection of resource materials, both texts and current journals. 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 access the Swinburne learning management system, Canvas, which is available via the Current Students 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; contributing fairly to group work; and completing tasks, tests and exams without cheating.

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 with regards to an exam or assessment are all breaches of academic integrity and treated as academic misconduct.

Plagiarism is submitting or presenting someone else's work as though it is your own without full and appropriate acknowledgement of their ideas and work. Examples include:

- using the whole or part of computer program written by another person as your own

- using the whole or part of somebody else's written work in an essay or other assessable work, including material from a book, journal, newspaper article, a website or database, a set of lecture notes, current or past student's work, or any other person's work
- poorly paraphrasing somebody else's work
- using a musical composition or audio, visual, graphic and photographic work created by another
- using realia created by another person, such as objects, artefacts, costumes, models
- submitting assessments that have been developed by another person or service (paid or unpaid), often 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. This is regardless of whether or not it is with the knowledge or consent of the other person(s).  Swinburne encourages students to talk to staff, fellow students and other people who may be able to contribute to a student's academic work but where an independent assignment is required, the work must be the student's own
- enabling others to plagiarise or 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 expulsion from the unit and, in the extreme, exclusion from Swinburne.

## 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.

## 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 will be 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.

## Accessibility needs

Sometimes students with a disability, a mental health or medical condition or significant carer responsibilities require reasonable adjustments to enable full access to and participation in education. Your needs can be addressed by Swinburne's AccessAbility Services by negotiating and distributing an 'Education Access Plan'.  The plan makes recommendations to University teaching and examination staff. You must notify AccessAbility Services of your disability or condition 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

Should 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.

For an appointment, please call 03 9214 5445 or email advocacy@swin.edu.au  For more information, please see https://www.swinburne.edu.au/current-students/student-services-support/advocacy/