



# COMP3160

## Artificial Intelligence

Session 2, In person-scheduled-weekday, North Ryde 2022

*School of Computing*

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#### **Disclaimer**

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## General Information

Unit convenor and teaching staff

Abhaya Nayak

[abhaya.nayak@mq.edu.au](mailto:abhaya.nayak@mq.edu.au)

Lecturer/Tutor

Manas Patra

[manas.patra@mq.edu.au](mailto:manas.patra@mq.edu.au)

Tutor

Ben Woods

Tutor

Canh Thanh Nguyen

Credit points

10

Prerequisites

130cp at 1000 level or above including COMP2000 or COMP229 or COMP2010 or COMP225 or COMP2110 or COMP249 or COMP2160

Corequisites

Co-badged status

Unit description

Artificial Intelligence (AI) is a well-established field that studies how computers and computer software capable of exhibiting intelligent behaviour can be designed. In this unit students will be exposed to fundamental concepts in AI such as agent architecture, knowledge representation, planning and search, as well as their application in some topical domains. Upon completion of this unit students will be able to apply problem-solving strategies that are required to build intelligent systems.

## Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

## Learning Outcomes

On successful completion of this unit, you will be able to:

**ULO1:** Describe the roles of various search techniques in AI and use appropriate tools to

implement them.

**ULO2:** Explain and implement basics of supervised machine learning algorithms

**ULO3:** Explain biologically inspired algorithms and their roles in AI, and implement some such algorithms in different contexts including adversarial games.

**ULO4:** Describe the role that uncertainty plays in AI, and demonstrate ability for sound reasoning of different sorts from uncertain knowledge.

## General Assessment Information

The assessment of this unit consists of two quizzes, two assignments and a final exam. The quizzes will be carried out online in iLearn. You will submit the solutions to the two assignments via iLearn by the due date. The form and date of the final examination will be announced later in the semester.

## Late Assessment Submission Penalty

**From 1 July 2022, Students enrolled in Session based units with written assessments will have the following late penalty applied. Please see <https://students.mq.edu.au/study/assessment-exams/assessments> for more information.**

Unless a Special Consideration request has been submitted and approved, a 5% penalty (of the total possible mark) will be applied each day a written assessment is not submitted, up until the 7<sup>th</sup> day (including weekends). After the 7<sup>th</sup> day, a grade of '0' will be awarded even if the assessment is submitted. Submission time for all written assessments is set at **11:55 pm**. A 1-hour grace period is provided to students who experience a technical concern.

For any late submission of time-sensitive tasks, such as scheduled tests/exams, performance assessments/presentations, and/or scheduled practical assessments/labs, students need to submit an application for [Special Consideration](#).

In this unit, late submissions will be accepted as follows:

- Quiz 1: NO, unless Special Consideration is granted
- Quiz 2: NO, unless Special Consideration is granted
- Assignment 1: YES, Standard Late Penalty applies
- Assignment 2: YES, Standard Late Penalty applies

## Supplementary Exam

In general, if you receive [Special Consideration](#) for the final exam, a supplementary exam will be scheduled after the normal exam period, following the release of marks. By making a special consideration application for the final exam you are declaring yourself available for a resit during the supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the policy prior to submitting an application. Approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination.

## Assessment Standards

COMP3160 will be assessed and graded according to the University assessment and grading policies.

The following general standards of achievement will be used to assess each of the assessment tasks with respect to the letter grades.

**Pass:** Can correctly reproduce facts and definitions across a breadth of concepts, but lacks depth of understanding. Can describe and/or employ search techniques in ways that are close to those discussed in lectures or notes. Can employ AI techniques to build a basic learning machine. Has basic understanding of biologically inspired algorithms and adversarial games. Has demonstrated some ability for sound reasoning in an uncertain domain.

**Credit/Distinction:** As for Pass plus: Exhibits breadth and depth of understanding of concepts. Can proficiently describe and/or employ search techniques going beyond how they were discussed in lectures or notes. Can employ AI techniques to build a very good learning machine. Has excellent understanding of biologically inspired algorithms and adversarial games, and can easily employ the former to develop strategies for the latter. Has excellent understanding of the role uncertainty plays in AI and demonstrated excellence for sound reasoning in uncertain domains.

**High Distinction:** As for Credit/Distinction plus: Is aware of the context in which the concepts are developed and their limitations. Can cogently describe in their own words and efficiently employ search techniques, going well beyond how they were discussed in lectures or notes. Can employ AI techniques to build an excellent learning machine. Has outstanding understanding of biologically inspired algorithms and adversarial games, and can easily employ the former to develop and evaluate strategies for the latter. Has excellent understanding of the role uncertainty plays in AI and has outstanding ability for sound reasoning in uncertain domains.

### Assessment Process

These assessment standards will be used to give a numeric mark to each assessment submission during marking. The mark will correspond to an appropriate letter grade when relevantly weighted. The final mark for the unit will be calculated by combining the marks for all assessment tasks according to the percentage weightings shown in the assessment summary.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#"><u>Quiz 1</u></a>	10%	No	Week 4
<a href="#"><u>Assignment 1</u></a>	20%	No	Week 7
<a href="#"><u>Quiz 2</u></a>	10%	No	Week 9
<a href="#"><u>Assignment 2</u></a>	20%	No	Week 11

Name	Weighting	Hurdle	Due
<u>Final Examination</u>	40%	No	TBA

## Quiz 1

Assessment Type <sup>1</sup>: Quiz/Test

Indicative Time on Task <sup>2</sup>: 7.5 hours

Due: **Week 4**

Weighting: **10%**

This test will give early feedback on students' understanding of basic AI concepts (in particular search) and Python programming skills, and help them prepare for Assignment 1.

On successful completion you will be able to:

- Describe the roles of various search techniques in AI and use appropriate tools to implement them.
- Explain and implement basics of supervised machine learning algorithms

## Assignment 1

Assessment Type <sup>1</sup>: Programming Task

Indicative Time on Task <sup>2</sup>: 15 hours

Due: **Week 7**

Weighting: **20%**

The first assignment will require students to demonstrate their skills in employing their knowledge of machine learning, and programming in Python.

On successful completion you will be able to:

- Describe the roles of various search techniques in AI and use appropriate tools to implement them.
- Explain and implement basics of supervised machine learning algorithms

## Quiz 2

Assessment Type <sup>1</sup>: Quiz/Test

Indicative Time on Task <sup>2</sup>: 7.5 hours

Due: **Week 9**

Weighting: **10%**

This test will help students prepare for Assignment 2.

On successful completion you will be able to:

- Explain biologically inspired algorithms and their roles in AI, and implement some such algorithms in different contexts including adversarial games.

## Assignment 2

Assessment Type <sup>1</sup>: Programming Task

Indicative Time on Task <sup>2</sup>: 15 hours

Due: **Week 11**

Weighting: **20%**

This assignment will require students to demonstrate their skills in employing their knowledge of biologically inspired algorithms to develop strategies for adversarial games.

On successful completion you will be able to:

- Describe the roles of various search techniques in AI and use appropriate tools to implement them.
- Explain biologically inspired algorithms and their roles in AI, and implement some such algorithms in different contexts including adversarial games.

## Final Examination

Assessment Type <sup>1</sup>: Examination

Indicative Time on Task <sup>2</sup>: 30 hours

Due: **TBA**

Weighting: **40%**

A final written examination.

On successful completion you will be able to:

- Describe the roles of various search techniques in AI and use appropriate tools to implement them.

- Explain and implement basics of supervised machine learning algorithms
  - Explain biologically inspired algorithms and their roles in AI, and implement some such algorithms in different contexts including adversarial games.
  - Describe the role that uncertainty plays in AI, and demonstrate ability for sound reasoning of different sorts from uncertain knowledge.
- 

<sup>1</sup> If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the [Writing Centre](#) for academic skills support.

<sup>2</sup> Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

## Delivery and Resources

### Classes

Each week you should attend two hours of lectures, and starting with the second week a tutorial class and a practical session. For details of days, times and rooms consult the timetables webpage. Students are urged to actively participate in the tutorials; this helps enhancing their understanding of the material.

Note that practicals and tutorials commence in week 2. You should have selected a practical session and a tutorial session during enrolment. You should attend the sessions you are enrolled in.

### Texts

There is no set textbook for the unit. The following are recommended readings. Lecturers may recommend other references.

S. Russell and P. Norvig. Artificial Intelligence: A Modern Approach, Prentice-Hall, 2020.

Poole, D. and Mackworth, AK. Artificial Intelligence - Foundations of Computational Agents. Cambridge University Press 2017. (Available free of charge at: <https://artint.info/2e/html/ArtInt2e.html> under a Creative Commons Attribution-Noncommercial-No Derivative Works 2.5 Canada License.)

For some parts of learning, the necessary reading (book chapters, software documentation, papers, etc.) will be made available on iLearn.

## Unit Webpage and Technology Used and Required

COMP3160 uses [iLearn](#) for delivery of class materials, discussion boards, submission of

assessment tasks and access to marks and comments. Students should check the iLearn site regularly for unit updates.

Questions that are of potential interest to other students in this unit, such as queries regarding the content of this unit, its tutorials or practicals, should be posted on discussion forum on iLearn.

The practical work in this unit mostly involves programming in Python3, and will require some packages relevant to AI. Instructions will be provided on how to use Python3 and these packages on the laboratory machines and how to download them for use on your own machines

## Unit Schedule

### Tentative Schedule

Week	Topic	Reading Material
1	Unit Organisation and Introduction to AI	Lecturer Supplied
2-4	Search in AI	Lecturer Supplied
5-7	Supervised Machine Learning, Evolutionary Algorithms	Lecturer Supplied
8-10	Adversarial Games and Multi-Agent Systems	Lecturer Supplied
11-12	Uncertainty in AI	Lecturer Supplied
13	Revision	

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

Students seeking more policy resources can visit [Student Policies \(https://students.mq.edu.au/support/study/policies\)](https://students.mq.edu.au/support/study/policies). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.



To find other policies relating to Teaching and Learning, visit [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au) and use the [search tool](#).

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/student-conduct>

## Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit [ask.mq.edu.au](https://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

## Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

## The Writing Centre

[The Writing Centre](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

## Student Services and Support

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study
- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support including information about finances, tenancy and legal issues](#)

## Student Enquiries

Got a question? Ask us via [AskMQ](#), or contact [Service Connect](#).

## IT Help

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/).

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

## Changes from Previous Offering

There was only one quiz in 2021. Based on the agreed upon action plan now there are two, aligned with the two assignments. The weight of the Final Exam has accordingly been reduced.