# COIT12213 *Applied Artificial Intelligence*
## Term 2 - 2024

Profile information current as at 04/07/2025 11:44 am



## General Information

### Overview
Artificial Intelligence (AI) involves developing systems that are autonomous and intelligent. This unit introduces you to contemporary and emerging AI technologies to address problems such as medical diagnosis, manufacturing optimisation and transport scheduling. You will investigate the application of AI technologies in areas such as computer vision, machine learning and deep learning. Fundamental AI concepts will be considered, including artificial neural networks and model validation techniques. You will develop AI systems using industry tools and learn to develop a business case for an AI system.

### Details
Career Level: *Undergraduate*
Unit Level: *Level 2*
Credit Points: *6*
Student Contribution Band: *8*
Fraction of Full-Time Student Load: *0.125*

### Pre-requisites or Co-requisites
Pre-requisite: COIT11222 Programming Fundamentals
Important note: Students enrolled in a subsequent unit who failed their pre-requisite unit, should drop the subsequent unit before the census date or within 10 working days of Fail grade notification. Students who do not drop the unit in this timeframe cannot later drop the unit without academic and financial liability. See details in the Assessment Policy and Procedure (Higher Education Coursework).

### Offerings For Term 2 - 2024

- Brisbane
- Cairns
- Melbourne
- Online
- Rockhampton
- Sydney

### Attendance Requirements
All on-campus students are expected to attend scheduled classes – in some units, these classes are identified as a mandatory (pass/fail) component and attendance is compulsory. International students, on a student visa, must maintain a full time study load and meet both attendance and academic progress requirements in each study period (satisfactory attendance for International students is defined as maintaining at least an 80% attendance record).

### Website
This unit has a website, within the Moodle system, which is available two weeks before the start of term. It is important that you visit your Moodle site throughout the term. Please visit Moodle for more information.

## Class and Assessment Overview

### Recommended Student Time Commitment

Each 6-credit Undergraduate unit at CQUniversity requires an overall time commitment of an average of 12.5 hours of study per week, making a total of 150 hours for the unit.

### Class Timetable

**Regional Campuses**
Bundaberg, Cairns, Emerald, Gladstone, Mackay, Rockhampton, Townsville

**Metropolitan Campuses**
Adelaide, Brisbane, Melbourne, Perth, Sydney

### Assessment Overview

1. **Online Quiz(zes)**
Weighting: 35%
2. **Group Work**
Weighting: 30%
3. **Written Assessment**
Weighting: 35%

### Assessment Grading

This is a graded unit: your overall grade will be calculated from the marks or grades for each assessment task, based on the relative weightings shown in the table above. You must obtain an overall mark for the unit of at least 50%, or an overall grade of 'pass' in order to pass the unit. If any 'pass/fail' tasks are shown in the table above they must also be completed successfully ('pass' grade). You must also meet any minimum mark requirements specified for a particular assessment task, as detailed in the 'assessment task' section (note that in some instances, the minimum mark for a task may be greater than 50%). Consult the University's Grades and Results Policy for more details of interim results and final grades.

## CQUniversity Policies

**All University policies are available on the CQUniversity Policy site.**
You may wish to view these policies:

- Grades and Results Policy
- Assessment Policy and Procedure (Higher Education Coursework)
- Review of Grade Procedure
- Student Academic Integrity Policy and Procedure
- Monitoring Academic Progress (MAP) Policy and Procedure – Domestic Students
- Monitoring Academic Progress (MAP) Policy and Procedure – International Students
- Student Refund and Credit Balance Policy and Procedure
- Student Feedback – Compliments and Complaints Policy and Procedure
- Information and Communications Technology Acceptable Use Policy and Procedure

This list is not an exhaustive list of all University policies. The full list of University policies are available on the CQUniversity Policy site.

## Previous Student Feedback

### Feedback, Recommendations and Responses

Every unit is reviewed for enhancement each year. At the most recent review, the following staff and student feedback items were identified and recommendations were made.

#### Feedback from Teaching Team

**Feedback**

Students feel overloaded with many new theoretical and practical concepts each week, making it difficult for some students to grasp key AI concepts.

**Recommendation**

Increase practical materials on important AI topics, such as image analysis, face recognition and deep learning models, while reducing some of the theory on less important topics.

#### Feedback from Head of Postgraduate ICT courses

**Feedback**

The Moodle site can be streamlined to make it more user-friendly and consistent to adhere with CQURenew guidelines.

**Recommendation**

Streamline the Moodle site to make it more consistent to adhere with CQURenew guidelines.

## Unit Learning Outcomes

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

1. Select Artificial Intelligence (AI) techniques to solve authentic problems including social innovation challenges
2. Apply industry tools to solve AI problems
3. Critique business cases for AI systems against social and ethical frameworks.

The Australian Computer Society (ACS) recognises the Skills Framework for the Information Age (SFIA). SFIA provides a consistent definition of ICT skills. SFIA is adopted by organisations, governments, and individuals in many countries and is increasingly used when developing job descriptions and role profiles.
ACS members can use the tool MySFIA to build a skills profile at https://www.acs.org.au/professionalrecognition/mysfia-b2c.html.
The Australian Computer Society (ACS) recognises the Skills Framework for the Information Age (SFIA). SFIA is adopted by organisations, governments and individuals in many countries and provides a widely used and consistent definition of ICT skills. SFIA is increasingly being used when developing job descriptions and role profiles. ACS members can use the tool MySFIA to build a skills profile.

This unit contributes to the following workplace skills as defined by SFIA 7 (the SFIA code is included)

- Analytics (INAN)
- Systems design (DESN)
- Data modelling and design (DTAN)
- Programming/Software Development (PROG)

## Alignment of Learning Outcomes, Assessment and Graduate Attributes

— N/A Level  ◦ Introductory Level  • Intermediate Level  • Graduate Level  ◦ Professional Level  ◦ Advanced Level

### Alignment of Assessment Tasks to Learning Outcomes

| Assessment Tasks | Learning Outcomes | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| 1 - Online Quiz(zes) - 35% | • | | |
| 2 - Group Work - 30% | | • | • |
| 3 - Written Assessment - 35% | • | • | • |

## Alignment of Graduate Attributes to Learning Outcomes

| Graduate Attributes | Learning Outcomes | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| 1 - Communication | • | • | • |
| 2 - Problem Solving | • | • | • |
| 3 - Critical Thinking | • | • | |
| 4 - Information Literacy | • | • | |
| 5 - Team Work | | • | • |
| 6 - Information Technology Competence | • | • | |
| 7 - Cross Cultural Competence | | | • |
| 8 - Ethical practice | | • | • |
| 9 - Social Innovation | | | • |
| 10 - Aboriginal and Torres Strait Islander Cultures | | | |

## Alignment of Assessment Tasks to Graduate Attributes

| Assessment Tasks | Graduate Attributes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1 - Online Quiz(zes) - 35% | | • | • | • | | • | | | | |
| 2 - Group Work - 30% | • | • | • | • | • | • | • | • | • | |
| 3 - Written Assessment - 35% | • | • | • | • | | • | • | • | • | |

## Textbooks and Resources

### Textbooks

COIT12213

**Prescribed**

**Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow**
Third Edition (18 October 2022)
Authors: Aurelien Geron
O Reilley
ISBN: 9781449369897

### IT Resources

**You will need access to the following IT resources:**

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- Google Colab

## Referencing Style

All submissions for this unit must use the referencing style: Harvard (author-date)
For further information, see the Assessment Tasks.

## Teaching Contacts

**Anwaar Ul-Haq** Unit Coordinator
a.anwaarulhaq@cqu.edu.au

## Schedule

**Week 1 - 08 Jul 2024**

| Module/Topic | Chapter | Events and Submissions/Topic |
|---|---|---|
| Introduction to Artificial Intelligence, History and Applications | Chapter 1 | Tutorial: A review of Python for AI Applications |

**Week 2 - 15 Jul 2024**

| Module/Topic | Chapter | Events and Submissions/Topic |
|---|---|---|
| Machine Learning, Model and Tools | Chapter 1 | Lab : AWS Cloud Academy -Machine Learning |

**Week 3 - 22 Jul 2024**

| Module/Topic | Chapter | Events and Submissions/Topic |
|---|---|---|
| Predictive Models: How to Predict | | Regression-Hands-on Lab Activity |

**Week 4 - 29 Jul 2024**

| Module/Topic | Chapter | Events and Submissions/Topic |
|---|---|---|
| Introduction to Neural Nets | | Perceptron-Hands-on Lab Activity |

**Week 5 - 05 Aug 2024**

| Module/Topic | Chapter | Events and Submissions/Topic |
|---|---|---|

| | | |
|---|---|---|
| Recognition with Computer Vision-CNN | | CNN-Hands-on Lab Activity<br>Assessment 1 Due: 09/08/2024 05:00 pm<br><br>**Knowledge Check quizzes,** Due: Week 5 Friday (9 Aug 2024) 5:00 pm AEST |
| **Vacation Week - 12 Aug 2024** | | |
| **Module/Topic** | **Chapter** | **Events and Submissions/Topic** |
| Session Break | | |
| **Week 6 - 19 Aug 2024** | | |
| **Module/Topic** | **Chapter** | **Events and Submissions/Topic** |
| Object Detection and Tracking | | Lab Activity |
| **Week 7 - 26 Aug 2024** | | |
| **Module/Topic** | **Chapter** | **Events and Submissions/Topic** |
| Natural Language Processing | | Lab Activity |
| **Week 8 - 02 Sep 2024** | | |
| **Module/Topic** | **Chapter** | **Events and Submissions/Topic** |
| Generative AI (GANS) | | Lab Activity<br>Assessment 2 Due:06/09/2024 5:00 PM<br><br>**AI Project** Due: Week 8 Friday (6 Sept 2024) 5:00 pm AEST |
| **Week 9 - 09 Sep 2024** | | |
| **Module/Topic** | **Chapter** | **Events and Submissions/Topic** |
| Ethical, Responsible and Explainable AI | | Tutorial Discussion |
| **Week 10 - 16 Sep 2024** | | |
| **Module/Topic** | **Chapter** | **Events and Submissions/Topic** |
| Robotics and Q-learning | | Lab Activity |
| **Week 11 - 23 Sep 2024** | | |
| **Module/Topic** | **Chapter** | **Events and Submissions/Topic** |
| AI on Cloud | | AWS Cloud Academy Machine Learning |
| **Week 12 - 30 Sep 2024** | | |
| **Module/Topic** | **Chapter** | **Events and Submissions/Topic** |
| Revision | | Revisions:<br>Assessment 3 Due: 04/10/2024 05:00 pm<br><br>**AI Ethics Report** Due: Week 12 Friday (4 Oct 2024) 5:00 pm AEST |
| **Review/Exam Week - 07 Oct 2024** | | |
| **Module/Topic** | **Chapter** | **Events and Submissions/Topic** |
| Exam Week | | |
| **Exam Week - 14 Oct 2024** | | |
| **Module/Topic** | **Chapter** | **Events and Submissions/Topic** |
| Exam Week | | |

## Assessment Tasks

### 1 Knowledge Check quizzes,

**Assessment Type**
Online Quiz(zes)

**Task Description**
As part of this assessment, students will be invited to enroll in the AWS Academy Machine Learning Foundations course. They may complete any three quizzes, such as the Module 2 Knowledge Check. Each module includes a knowledge check quiz. The scores of the completed quizzes will contribute 35% to the total assessment for this subject.

**Number of Quizzes**
1

**Frequency of Quizzes**
Other

**Assessment Due Date**
Week 5 Friday (9 Aug 2024) 5:00 pm AEST

**Return Date to Students**
Week 7 Monday (26 Aug 2024)

Scores will be made available.

**Weighting**
35%

**Assessment Criteria**
The AWS Academy Machine Learning Foundations course consists of eight modules. The first four modules are foundational, and students need to complete quizzes for any three of these modules. All students will be invited to enroll and should be able to complete the course online. Each quiz contains 10-15 multiple-choice questions, with no time restrictions on each quiz. The scores of the completed quizzes will contribute 35% to the total assessment for this subject.

**Referencing Style**

- Harvard (author-date)

**Submission**
Online

**Submission Instructions**
Will be provided on Moodle.

**Learning Outcomes Assessed**

- Select Artificial Intelligence (AI) techniques to solve authentic problems including social innovation challenges

**Graduate Attributes**

- Problem Solving
- Critical Thinking
- Information Literacy
- Information Technology Competence

### 2 AI Project

**Assessment Type**
Group Work

**Task Description**
Assignment 2 is a group project where students work together to write Python code for specific problem-solving tasks. They are required to choose and justify the use of AI tools & techniques for these tasks. Details, including the project description, data, and sources, are provided on the Moodle site. The unit coordinator assigns groups with a maximum size of three. Individual contributions are assessed, and while group members may receive similar marks based on participation, each student's unique contribution is considered.
This assessment will address the following unit learning outcomes: Apply industry tools to solve AI problems and critique business cases for AI systems against social and ethical frameworks.

**Assessment Due Date**
Week 8 Friday (6 Sept 2024) 5:00 pm AEST

**Return Date to Students**
Week 11 Monday (23 Sept 2024)

**Weighting**
30%

**Assessment Criteria**
A detailed rubric and marking criteria will be made available on Moodle as part of the comprehensive assessment description. This document will provide clear guidelines for the evaluation process, offering transparency on how assignments will be assessed and graded. Students are encouraged to refer to this resource for a thorough understanding of the expectations and criteria that will inform the assessment of their work

**Referencing Style**

- Harvard (author-date)

**Submission**
Online Group

**Submission Instructions**
Submit online via Moodle link.

**Learning Outcomes Assessed**

- Apply industry tools to solve AI problems
- Critique business cases for AI systems against social and ethical frameworks.

**Graduate Attributes**

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Team Work
- Information Technology Competence
- Cross Cultural Competence
- Ethical practice
- Social Innovation

## 3 AI Ethics Report

**Assessment Type**
Written Assessment

**Task Description**
Assignment 3 is an individual task where students develop a written artefact (document) on a business case specified by the unit coordinator. Students must apply the knowledge and skills acquired throughout the unit to prepare this document.  This assessment will address the following unit learning outcomes: select Artificial Intelligence (AI) techniques to solve authentic problems, including social innovation challenges.

**Assessment Due Date**
Week 12 Friday (4 Oct 2024) 5:00 pm AEST

**Return Date to Students**
Review/Exam Week Monday (7 Oct 2024)

Upon grade certification

**Weighting**
35%

**Assessment Criteria**
Assignment 3 is an individual task where students develop a written artifact (document) on a business case specified by the unit coordinator. The work will be evaluated based on the quality of learning from the subject content and the knowledge of international AI standards and frameworks for ethical AI in the provided business scenario. A detailed rubric will be provided on Moodle.

**Referencing Style**

- Harvard (author-date)

**Submission**
Online

**Submission Instructions**
Submit via Moodle

**Learning Outcomes Assessed**

- Select Artificial Intelligence (AI) techniques to solve authentic problems including social innovation challenges
- Apply industry tools to solve AI problems
- Critique business cases for AI systems against social and ethical frameworks.

**Graduate Attributes**

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Information Technology Competence
- Cross Cultural Competence
- Ethical practice
- Social Innovation

## Academic Integrity Statement

As a CQUniversity student you are expected to act honestly in all aspects of your academic work.

Any assessable work undertaken or submitted for review or assessment must be your own work. Assessable work is any type of work you do to meet the assessment requirements in the unit, including draft work submitted for review and feedback and final work to be assessed.

When you use the ideas, words or data of others in your assessment, you must thoroughly and clearly acknowledge the source of this information by using the correct referencing style for your unit. Using others' work without proper acknowledgement may be considered a form of intellectual dishonesty.

Participating honestly, respectfully, responsibly, and fairly in your university study ensures the CQUniversity qualification you earn will be valued as a true indication of your individual academic achievement and will continue to receive the respect and recognition it deserves.

As a student, you are responsible for reading and following CQUniversity's policies, including the **Student Academic Integrity Policy and Procedure**. This policy sets out CQUniversity's expectations of you to act with integrity, examples of academic integrity breaches to avoid, the processes used to address alleged breaches of academic integrity, and potential penalties.

**What is a breach of academic integrity?**
A breach of academic integrity includes but is not limited to plagiarism, self-plagiarism, collusion, cheating, contract cheating, and academic misconduct. The Student Academic Integrity Policy and Procedure defines what these terms mean and gives examples.

**Why is academic integrity important?**
A breach of academic integrity may result in one or more penalties, including suspension or even expulsion from the University. It can also have negative implications for student visas and future enrolment at CQUniversity or elsewhere. Students who engage in contract cheating also risk being blackmailed by contract cheating services.

**Where can I get assistance?**
For academic advice and guidance, the Academic Learning Centre (ALC) can support you in becoming confident in completing assessments with integrity and of high standard.

**What can you do to act with integrity?**

**Be Honest**
If your assessment task is done by someone else, it would be dishonest of you to claim it as your own

**Seek Help**
If you are not sure about how to cite or reference in essays, reports etc, then seek help from your lecturer, the library or the Academic Learning Centre (ALC)

**Produce Original Work**
Originality comes from your ability to read widely, think critically, and apply your gained knowledge to address a question or problem