

# Course Outline (Higher Education)

<b>Institute / School:</b>	Institute of Innovation, Science & Sustainability
<b>Course Title:</b>	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
<b>Course ID:</b>	ITECH7001
<b>Credit Points:</b>	15.00
<b>Prerequisite(s):</b>	(ITECH5104)
<b>Co-requisite(s):</b>	(An approved mathematics or information technology elective.)
<b>Exclusion(s):</b>	(ITECH2111)
<b>ASCED:</b>	020119

## Description of the Course:

Artificial intelligence and machine learning are increasingly important in the rapidly advancing technological landscape. They play a role in many aspects of life. While the scope of applications is diverse and useful, they also come with a host of philosophical and ethical considerations. This course exposes students to the theory and practical methods associated with the field of artificial intelligence (AI). Students will gain an appreciation for the philosophy, history and applications of artificial intelligence. They will gain an understanding of the functioning of core algorithms within AI, and skills in the application of software tools which implement those algorithms. Areas covered will include knowledge representation, logic and automated reasoning, search, and modelling uncertainty, with a particular emphasis on techniques associated with various areas of machine learning, including unsupervised, supervised and reinforcement learning. Students will also be required to consider the ethics associated with the development and deployment of AI technology within society, and understand the importance of factors such as fairness, safety and explainability.

**Grade Scheme:** Graded (HD, D, C, P, MF, F, XF)

## Work Experience:

No work experience: Student is not undertaking work experience in industry.

**Does Recognition of Prior Learning apply to this course?** No

**Placement Component:** No

**Supplementary Assessment:** Yes

Where supplementary assessment is available a student must have failed overall in the course but gained a

final mark of 45 per cent or above and submitted all major assessment tasks.

### Program Level:

Level of course in Program	AQF Level of Program					
	5	6	7	8	9	10
Introductory	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Intermediate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Advanced	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Learning Outcomes:

#### Knowledge:

- K1.** Identify and explain a range of artificial intelligence algorithms and methodologies for solving complex problems.
- K2.** Recognise and outline historical and current progress across a range of artificial intelligence approaches.
- K3.** Explain how to design and deploy artificial intelligence so as to produce beneficial and equitable outcomes for society.

#### Skills:

- S1.** Represent knowledge using different techniques to solve complex problems;
- S2.** Select, set up and apply appropriate algorithmic approaches for solving a variety of complex problems and real world situations.
- S3.** Prepare data for use as input to machine learning systems.
- S4.** Interpret, compare and report on algorithm output and performance in different contexts.

#### Application of knowledge and skills:

- A1.** Display initiative and judgement in adapting algorithms to unique and diverse contexts.
- A2.** Research and interpret appropriate developments in Artificial Intelligence.

#### Course Content:

Topics may include:

1. History and philosophy behind artificial intelligence; current and future applications of artificial intelligence; social implications of AI
2. Logic and search;
3. Knowledge representation, and reasoning - including reasoning with uncertainty;
4. Machine learning - overview, development processes and tools
5. Supervised and semi-supervised learning
6. Dimension reduction, clustering and unsupervised learning;
7. Neural networks and deep learning; deep learning architectures
8. Reinforcement learning;

## FEDTASKS

Federation University Federation recognises that students require key transferable employability skills to prepare them for their future workplace and society. FEDTASKS (**T**ransferable **A**tttributes **S**kills and **K**nowledge) provide a targeted focus on five key transferable Attributes, Skills, and Knowledge that are embedded within curriculum, developed gradually towards successful measures and interlinked with cross-discipline and Co-operative Learning opportunities. *One or more FEDTASK, transferable Attributes, Skills or Knowledge must be evident in the specified learning outcomes and assessment for each FedUni course, and all must be directly assessed in each program.*

FEDTASK attribute and descriptor		Development and acquisition of FEDTASKS in the course	
		Learning Outcomes (KSA)	Assessment task (AT#)
FEDTASK 1 Interpersonal	Students at this level will demonstrate an advanced ability in a range of contexts to effectively communicate, interact and work with others both individually and in groups. Students will be required to display high level skills in-person and/or online in: <ul style="list-style-type: none"> <li>• Using and demonstrating a high level of verbal and non-verbal communication</li> <li>• Demonstrating a mastery of listening for meaning and influencing via active listening</li> <li>• Demonstrating and showing empathy for others</li> <li>• High order skills in negotiating and conflict resolution skills</li> <li>• Demonstrating mastery of working respectfully in cross-cultural and diverse teams.</li> </ul>	K1, S4	AT1, AT2
FEDTASK 2 Leadership	Students at this level will demonstrate a mastery in professional skills and behaviours in leading others. <ul style="list-style-type: none"> <li>• Creating and sustaining a collegial environment</li> <li>• Demonstrating a high level of self-awareness and the ability to self-reflect and justify decisions</li> <li>• Inspiring and initiating opportunities to lead others</li> <li>• Making informed professional decisions</li> <li>• Demonstrating initiative in new professional situations</li> </ul>	S4, A1, A2	AT2
FEDTASK 3 Critical Thinking and Creativity	Students at this level will demonstrate high level skills in working in complexity and ambiguity using the imagination to create new ideas. Students will be required to display skills in: <ul style="list-style-type: none"> <li>• Reflecting critically to generate and consider complex ideas and concepts at an abstract level</li> <li>• Analysing complex and abstract ideas, concepts and information</li> <li>• Communicate alternative perspectives to justify complex ideas</li> <li>• Demonstrate a mastery of challenging conventional thinking to clarify complex concepts</li> <li>• Forming creative solutions in problem solving to new situations for further learning</li> </ul>	S1, S2, S4, A1, A2	AT2

FEDTASK attribute and descriptor		Development and acquisition of FEDTASKS in the course	
		Learning Outcomes (KSA)	Assessment task (AT#)
FEDTASK 4 Digital Literacy	Students at this level will demonstrate the ability to work competently across a wide range of tools, platforms and applications to achieve a range of tasks. Students will be required to display skills in: <ul style="list-style-type: none"> <li>• Mastering, exploring, evaluating, managing, curating, organising and sharing digital information professionally</li> <li>• Collating, managing complex data, accessing and using digital data securely</li> <li>• Receiving and responding professionally to messages in a range of professional digital media</li> <li>• Contributing competently and professionally to digital teams and working groups</li> <li>• Participating at a high level in digital learning opportunities</li> </ul>	S1, S2, S3, S4, A2	AT1, AT2
FEDTASK 5 sustainable and Ethical Mindset	Students at this level will demonstrate a mastery of considering and assessing the consequences and impact of ideas and actions in enacting professional ethical and sustainable decisions. Students will be required to display skills in: <ul style="list-style-type: none"> <li>• Demonstrate informed judgment making that considers the impact of devising complex solutions in ambiguous global economic environmental and societal contexts</li> <li>• Professionally committing to the promulgation of social responsibility</li> <li>• Demonstrate the ability to evaluate ethical, socially responsible and/or sustainable challenges and generating and articulating responses</li> <li>• Communicating lifelong, life-wide and life-deep learning to be open to the diverse professional others</li> <li>• Generating, leading and implementing required actions to foster sustainability in their professional and personal life.</li> </ul>	K3, A2	AT2, AT3

### Learning Task and Assessment:

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
K1, K2, S1, S2, S3	Weekly tasks such as on-line quizzes; discussion of ideas in an on-line forum; and recording a journal on how to solve problems using AI techniques.	Journal, forum, quizzes and/or exercises	20% - 35%
K3, S1, S2, S3, S4, A1, A2	Students will review industry and/or academic research, and prepare reports relating the topic of each week's classes to an existing or potential industry application of AI. They will also prepare a report on the potential impact of AI on our society.	Written Report	35% - 50%
K1, K2, K3, S1, S2, S3	Questions covering a range of algorithms, methodologies, knowledge representations, appropriate algorithm setups and data abstraction methodologies.	Test(s)	30% - 40%

### Alignment to the Minimum Co-Operative Standards (MiCS)

The Minimum Co-Operative Standards (MiCS) are an integral part of the Co-Operative University Model. Seven criteria inform the MiCS alignment at a program level. Although courses must undertake MiCS mapping, there is NO expectation that courses will meet all seven criteria. The criteria are as follows:

1. Co-design with industry and students

2. Co-develop with industry and students
3. Co-deliver with industry
4. FedTASK alignment
5. Workplace learning and career preparation
6. Authentic assessment
7. Industry-link/Industry facing experience

MiCS program level reporting highlights how each program embraces the principals and practices associated with the Co-Operative Model. Evidence of program alignment with the MiCS, can be captured in the Program Modification Form.

**MICS Mapping has been undertaken for this course** No

Date:

**Adopted Reference Style:**

APA

Refer to the [library website](#) for more information

Fed Cite - [referencing tool](#)