



Unit Outline (Higher Education)

Institute / School: Institute of Innovation, Science & Sustainability

Unit Title: Algorithms for Artificial Intelligence

Unit ID: ITECH2500

Credit Points: 15.00

Prerequisite(s): (ITECH1400 and MATHS2100)

Co-requisite(s): Nil

Exclusion(s): (ITECH2111 and ITECH6111 and ITECH7001)

ASCED: 020119

Description of the Unit:

This unit provides you with an introduction to artificial intelligence and its relationship to other disciplines. You will be looking at the historical and contemporary contexts, and considering future trends. Whilst delving into the different forms of machine learning approaches, there is an emphasis on knowledge representation, automated reasoning, predictive modelling and problem solving.

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

Work Experience:

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

Placement Component: No

Supplementary Assessment: Yes

Where supplementary assessment is available a student must have failed overall in the Unit but gained a final mark of 45 per cent or above, has completed all major assessment tasks (including all sub-components where a task has multiple parts) as specified in the Unit Description and is not eligible for any other form of supplementary assessment

Course Level:

Level of Unit in Course	AQF Level of Course					
	5	6	7	8	9	10
Introductory	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Intermediate	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" 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.** Recognize 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.** Apply abstract data models appropriate for a range of Artificial Intelligence solutions;
- S4.** Interpret, compare and report on algorithm performance in different contexts.

Application of knowledge and skills:

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

Unit 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 Unit, and all must be directly assessed in each Course.*

FEDTASK attribute and descriptor		Development and acquisition of FEDTASKS in the Unit	
		Learning Outcomes (KSA)	Assessment task (AT#)
FEDTASK 1 Interpersonal	<p>Students will demonstrate the ability to effectively communicate, inter-act and work with others both individually and in groups. Students will be required to display skills in-person and/or online in:</p> <ul style="list-style-type: none"> Using effective verbal and non-verbal communication Listening for meaning and influencing via active listening Showing empathy for others Negotiating and demonstrating conflict resolution skills Working respectfully in cross-cultural and diverse teams. 	Not applicable	AT2
FEDTASK 2 Leadership	<p>Students will demonstrate the ability to apply professional skills and behaviours in leading others. Students will be required to display skills in:</p> <ul style="list-style-type: none"> Creating a collegial environment Showing self-awareness and the ability to self-reflect Inspiring and convincing others Making informed decisions Displaying initiative 	A1	AT2
FEDTASK 3 Critical Thinking and Creativity	<p>Students will demonstrate an ability to work in complexity and ambiguity using the imagination to create new ideas. Students will be required to display skills in:</p> <ul style="list-style-type: none"> Reflecting critically Evaluating ideas, concepts and information Considering alternative perspectives to refine ideas Challenging conventional thinking to clarify concepts Forming creative solutions in problem solving. 	S2, S4, A1	AT2

FEDTASK attribute and descriptor		Development and acquisition of FEDTASKS in the Unit	
		Learning Outcomes (KSA)	Assessment task (AT#)
FEDTASK 4 Digital Literacy	<p>Students will demonstrate the ability to work fluently across a range of tools, platforms and applications to achieve a range of tasks. Students will be required to display skills in:</p> <ul style="list-style-type: none"> Finding, evaluating, managing, curating, organising and sharing digital information Collating, managing, accessing and using digital data securely Receiving and responding to messages in a range of digital media Contributing actively to digital teams and working groups Participating in and benefiting from digital learning opportunities. 	S1, S2, S3, S4	AT1, AT2
FEDTASK 5 Sustainable and Ethical Mindset	<p>Students will demonstrate the ability to consider and assess the consequences and impact of ideas and actions in enacting ethical and sustainable decisions. Students will be required to display skills in:</p> <ul style="list-style-type: none"> Making informed judgments that consider the impact of devising solutions in global economic environmental and societal contexts Committing to social responsibility as a professional and a citizen Evaluating ethical, socially responsible and/or sustainable challenges and generating and articulating responses Embracing lifelong, life-wide and life-deep learning to be open to diverse others Implementing required actions to foster sustainability in their professional and personal life. 	K3	AT1

Learning Task and Assessment:

Assessment for this course will be based on a number of tasks including weekly tasks, written reports, and an end of semester examination covering theoretical aspects of the course.

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
K1, K2, K3, S1, S2, S3.	Weekly tasks including: quizzes; discussion of ideas; and recording a journal on how to solve problems using AI techniques.	Journal, forum, quizzes and/or exercises	20% - 40%
S1, S2, S3, S4, A1, A2.	Students will conduct research to select a small set of algorithms, design a suitable knowledge representation and data abstraction, and setup and apply the algorithms on a complex problem. Students will conduct experiments and write a report justifying their choices, as well as interpreting and comparing the algorithms.	Practical works and reports	50% - 70%

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
S1, S2, S3, S4, A1, A2.	Students will present the findings made during execution of their projects, justify choices made, explain problems encountered and limitations of their experiments.	Presentations and/or oral test	10% - 30%

Adopted Reference Style:

APA

Refer to the [library website](#) for more informationFed Cite - [referencing tool](#)