KING'S OWN INSTITUTE*

Success in Higher Education

ICT371 ARTIFICIAL INTELLIGENCE T326 BRIEF

All information in the Subject Outline is correct at the time of approval. KOI reserves the right to make changes to the Subject Outline if they become necessary. Any changes require the approval of the KOI Academic Board and will be formally advised to those students who may be affected by email and via Moodle.
Information contained within this Subject Outline applies to students enrolled in the trimester as indicated

1. General Information

1.1 Administrative Details

Associated HE Award(s)	Duration	Level	Subject Coordinator
Bachelor of Information Technology (BIT)	1 trimester	Level 3	Saeid Iranmanesh saeid.iranmanesh@koi.edu.au P: +61 (2) 9283 3583 L: 7-11,11 York St. Consultation: via Moodle or by appointment.

1.2 Core / Elective

Elective subject for BIT

1.3 Subject Weighting

Indicated below is the weighting of this subject and the total course points.

Subject Credit Points	Total Course Credit Points
4	BIT (96 Credit Points)

1.4 Student Workload

Indicated below is the expected student workload per week for this subject

No. Timetabled Hours/Week*	No. Personal Study Hours/Week**	Total Workload Hours/Week***
4 hours/week (2 hour Lecture + 2 hour Tutorial)	6 hours/week	10 hours/week

* Total time spent per week at lectures and tutorials
** Total time students are expected to spend per week in studying, completing assignments, etc.
*** Combination of timetable hours and personal study.

1.1 Mode of Delivery Classes will be face-to-face or hybrid. Certain classes will be online (e.g., special arrangements).

1.6 Pre-requisites ICT104 Program Design and Development and Successful completion of 48 credit points

1.7 General Study and Resource Requirements

- Dedicated computer laboratories are available for student use. Normally, tutorial classes are conducted in the computer laboratories
- Students are expected to attend classes with the requisite textbook and must read specific chapters prior to each tutorial. This will allow them to actively take part in discussions. Students should have elementary skills in both word processing and electronic spreadsheet software, such as Office 365 or MS Office

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- Computers and WIFI facilities are extensively available for student use throughout KOI. Students are encouraged to make use of the campus Library for reference materials
- Students will require access to the internet and email. Where students use their own computers, they should have internet access. KOI will provide access to required software.

Resource requirements specific to this subject: Rapid miner, Office 365, MS Imagine.

1.8 Academic Advising

Academic advising is available to students throughout teaching periods including the exam weeks. As well as requesting help during scheduled class times, students have the following options:

- Consultation times: A list of consultation hours is provided on the homepage of Moodle where appointments can be booked.
- Subject coordinator: Subject coordinators are available for contact via email. The email address of the subject coordinator is provided at the top of this subject outline.
- Academic staff: Lecturers and Tutors provide their contact details in Moodle for the specific subject. In most cases, this will be via email. Some subjects may also provide a discussion forum where questions can be raised.
- Head of Program: The Head of Program is available to all students in the program if they need advice about their studies and KOI procedures.
- Vice President (Academic): The Vice President (Academic) will assist students to resolve complex issues (but may refer students to the relevant lecturers for detailed academic advice).

2 Academic Details

2.1 Overview of the Subject

The goal of Artificial Intelligence is to build software systems that behave "intelligently". That is, do these computer systems "do the right thing" in complex environments? Do they act optimally given the limited information and computational resources available? How is this aim interpreted? This subject covers the core topics of Artificial Intelligence such as knowledge representation, reasoning, and learning. Students will learn to design and analyse autonomous agents that do the right thing in the face of limited computational resources and limited information. This subject examines agents that can effectively make decisions in fully observable, partially observable and adversarial environments, and agents that can adapt their actions by learning from experience.

2.2 Graduate Attributes for Undergraduate Courses

Graduates of Bachelor courses from King's Own Institute (KOI) will achieve the graduate attributes expected under the Australian Qualifications Framework (2nd edition, January 2013). Graduates at this level will be able to apply a broad and coherent body of knowledge from their major area of study in a range of contexts for professional practice or scholarship and as a pathway for further learning.

King's Own Institute's generic graduate attributes for a bachelor's level degree are summarised below:

	KOI Bachelor Degree Graduate Attributes	Detailed Description
	Knowledge	Current, comprehensive, and coherent and connected knowledge
	Critical Thinking	Critical thinking and creative skills to analyse and synthesise information and evaluate new problems

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	Communication	Communication skills for effective reading, writing, listening and presenting in varied modes and contexts and for transferring knowledge and skills to a variety of audiences
	Information Literacy	Information and technological skills for accessing, evaluating, managing and using information professionally
	Problem Solving Skills	Skills to apply logical and creative thinking to solve problems and evaluate solutions
	Ethical and Cultural Sensitivity	Appreciation of ethical principles, cultural sensitivity and social responsibility, both personally and professionally
	Teamwork	Leadership and teamwork skills to collaborate, inspire colleagues and manage responsibly with positive results
	Professional Skills	Professional skills to exercise judgement in planning, problem solving and decision making

Across the course, these skills are developed progressively at three levels:

- **Level 1 Foundation** – Students learn the basic skills, theories and techniques of the subject and apply them in basic, standalone contexts
- **Level 2 Intermediate** – Students further develop the skills, theories and techniques of the subject and apply them in more complex contexts, and begin to integrate this application with other subjects.
- **Level 3 Advanced** – Students demonstrate an ability to plan, research and apply the skills, theories and techniques of the subject in complex situations, integrating the subject content with a range of other subject disciplines within the context of the course.

2.3 Subject Learning Outcomes

This is a Level 3 subject.

On successful completion of this subject, students should be able to:

Subject Learning Outcomes	Contribution to Graduate Attributes
a) Identify problems that are amenable to solution by AI methods and select AI methods suited to solving such problems	
b) Formulate a given problem in the language/framework of different AI methods (for example, as a search problem, as a constraint satisfaction problem, or as a planning problem)	
c) Analyse AI algorithms (e.g., standard search or constraint propagation algorithms)	
d) Solve simple problems using AI techniques and algorithms.	

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2.4 Subject Content and Structure

Below are details of the subject content and how it is structured, including specific topics covered in lectures and tutorials. Reading refers to the text unless otherwise indicated.

Weekly Planner:

Week (beginning)	Topic covered in each week's lecture	Reading(s)	Expected work as listed in Moodle
Week 1 26 October	Introduction to AI	Ch. 1	Tutorial exercises based on lecture topics are intended to stimulate discussion. Discussing AI applications and understanding the latest AI technologies. Formative weekly tutorial
Week 2 02 November	Intelligent Agents	Ch. 2	Tutorial exercises based on lecture topics are intended to stimulate discussion. Introduction to rapid miner as an AI tool. Summative worth 1%
Week 3 09 November	Solving Problem by Searching	Ch. 3	Tutorial exercises based on lecture topics are intended to stimulate discussion. Rapid Miner: Data loading and problem understanding, problem space understanding. Summative worth 1%
Week 4 16 November	Beyond Classical Search	Ch. 4	Tutorial exercises based on lecture topics are intended to stimulate discussion. Discussing and analysing genetic algorithms in terms of cross-over, mutation, parent selection, local and absolute minima/maxima. Summative worth 1% **Assessment 2 due: Formative Quiz (0%)**
Week 5 23 November	Adversarial search	Ch. 5	Tutorial exercises based on lecture topics are intended to stimulate discussion. Rapid Miner: decision tree Summative worth 1% **Assessment 3 due:** Intelligent Agents analysis - Individual (20%)

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Week (beginning)	Topic covered in each week's lecture	Reading(s)	Expected work as listed in Moodle
Week 6 30 November	Constraint satisfaction problem	Ch. 6	Tutorial exercises based on lecture topics are intended to stimulate discussion. Rapid Miner: artificial neural network. Summative worth 1%
Week 7 07 December	Logical Agent	Ch. 7	Tutorial exercises based on lecture topics are intended to stimulate discussion. Rapid Miner: K-means Summative worth 1%
Week 8 14 December	First order logic	Ch. 8	Tutorial exercises based on lecture topics are intended to stimulate discussion. Discussing logic programming to build a solver. Summative worth 1%
Week 9 04 January	Probability reasoning	Ch. 14	Tutorial exercises based on lecture topics are intended to stimulate discussion. Rapid Miner: text mining. Summative worth 1% **Assessment 4 due: In-class test (35%)**
Week 10 11 January	Learning from examples 1	Ch. 18	Tutorial exercises based on lecture topics are intended to stimulate discussion. Rapid Miner: Association Rules Summative worth 1%
Week 11 18 January	Learning from examples 2	Ch. 18	Tutorial exercises based on lecture topics are intended to stimulate discussion. Rapid Miner: Some Tips for Assignment 2 Summative worth 1% **Assessment 5 due:** Knowledge based Project-group - Report Submission(25%).
Week 12 25 January	Revision	All Chapters	Revision **Assessment 5 due:** Knowledge based Project-group - Demonstration (10%).
Week 13 01 February	Study review week and Final Exam Week		
Week 14 08 February	- Final Exam Week - Continuing students - enrolments for T127 open		Please see the exam timetable for the exam date, time and location

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Week (beginning)	Topic covered in each week's lecture	Reading(s)	Expected work as listed in Moodle
Week 15 15 February	- Student Vacation begins - New students - enrolments for T127 open		
Week 16 22 February	o Results Released o Review of Grade Day for T326 – see Sections 2.6 and 3.2 below for relevant information. o Certification of Grades NOTE: More information about the dates will be provided at a later date through Moodle/KOI email.		
T127 01 March 2027			
Week 1 01 March	Week 1 of classes for T127		

2.5 Teaching Methods/Strategies

Briefly described below are the teaching methods/strategies used in this subject:

- *Lectures* (2 hours/week) are conducted in seminar style and address the subject content, provide motivation and context and draw on the students' experience and preparatory reading.
- *Tutorials* (2 hours/week) include class discussion of case studies and research papers, practice sets and problem-solving and syndicate work on group projects. Tutorials often include group exercises and so contribute to the development of teamwork skills and cultural understanding. Tutorial participation is an essential component of the subject and contributes to the development of many of the graduate attributes (see section 2.2 above). Tutorial participation contributes towards the assessment in many subjects (see details in Section 3.1 for this subject). Supplementary tutorial material such as case studies, recommended readings, review questions etc. will be made available each week in Moodle.
- *Online* teaching resources include class materials, readings, model answers to assignments and exercises and discussion boards. All online materials for this subject as provided by KOI will be found in the Moodle page for this subject. Students should access Moodle regularly as material may be updated at any time during the trimester
- *Other contact* - academic staff may also contact students either via Moodle messaging, or via email to the email address provided to KOI on enrolment.

2.6 Student Assessment

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Assessment is designed to encourage effective student learning and enable students to develop and demonstrate the skills and knowledge identified in the subject learning outcomes. Assessment tasks during the first half of the study period are usually intended to maximise the developmental function of assessment (formative assessment). These assessment tasks include weekly tutorial exercises (as indicated in the weekly planner) and low stakes graded assessment (as shown in the graded assessment table). The major assessment tasks where students demonstrate their knowledge and skills (summative assessment) generally occur later in the study period. These are the major graded assessment items shown in the graded assessment table.

Final grades are awarded by the Board of Examiners in accordance with KOI's Assessment and Assessment Appeals Policy. The definitions and guidelines for the awarding of final grades within the BIT degree are:

- HD High distinction (85-100%) an outstanding level of achievement in relation to the assessment process.
- DI Distinction (75-84%) a high level of achievement in relation to the assessment process.
- CR Credit (65-74%) a better than satisfactory level of achievement in relation to the assessment process.
- P Pass (50-64%) a satisfactory level of achievement in relation to the assessment process.
- F Fail (0-49%) an unsatisfactory level of achievement in relation to the assessment process.

Provided below is a schedule of formal assessment tasks and major examinations for the subject.

Assessment Type	When assessed	Weighting	Learning Outcomes Assessed
Assessment 1: Weekly Tutorials - Individual	Week 2 – Week 11	10%	a, b, c, d
Assessment 2: Formative Quiz	Week 4	0%	a
Assessment 3: Intelligent Agent Analysis - Individual	Week 5 - Report Submission	20%	a, b
Assessment 4: In-Class Test	Week 9	35%	b, c
Assessment 5: Knowledge-based Project - group (Report and Demonstration)	Week 11: Report submission Week 12 Demonstration **In Class demonstration**	35% (25% report + 10% demonstration)	a, b, c, d

Requirements to Pass the Subject:

To gain a pass or better in this subject, students must gain a *minimum of 50%* of the total available subject marks.

2.7 Prescribed and Recommended Readings

Provided below, in formal reference format, is a list of the prescribed and recommended readings.

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Prescribed Text:

Russell, S, & Norvig, P 2021, *Artificial Intelligence: A Modern Approach*, Global 4th edition, Pearson Education Limited, Harlow, United Kingdom. ISBN: 9780134610993

Recommended Readings:

Huda, N.U., Ahmed, I., Adnan, M., Ali, M., and Naeem, F., 2024. Experts and intelligent systems for smart homes' Transformation to Sustainable Smart Cities: *A comprehensive review*. Expert Systems with Applications, 238, p.122-380. DOI: 10.1016/j.eswa.2023.122380

Hejase, M., Katis, A., and Mavridou, A., 2024. Design, formalization, and verification of decision making for intelligent systems. In: AIAA SCITECH 2024 Forum, p.2409. DOI: 10.2514/6.2024-2409

Ahmed, H.M. and Sorour, S.E., 2024. Classification-driven intelligent system for automated evaluation of higher education exam paper quality. *Education and Information Technologies*, pp.1-27. DOI: 10.1007/s10639-024-12555-9

Varsha, P.S., 2023. How can we manage biases in artificial intelligence systems–A systematic literature review. *International Journal of Information Management Data Insights*, 3(1), p.100165. DOI: 10.1016/j.jjimei.2023.100165

Ahmad, K., Abdelrazek, M., Arora, C., Bano, M., and Grundy, J., 2023. Requirements engineering for artificial intelligence systems: A systematic mapping study. *Information and Software Technology*, 158, p.107176. DOI: 10.1016/j.infsof.2023.107176

Vyas, B., 2023. Java-Powered AI: Implementing Intelligent Systems with Code. *Journal of Science & Technology*, 4(6), pp.1-12. DOI: 10.55662/JST.2023.4601

Pimenov, D.Y., Bustillo, A., Wojciechowski, S., Sharma, V.S., Gupta, M.K. and Kuntoğlu, M., 2023. Artificial intelligence systems for tool condition monitoring in machining: Analysis and critical review. *Journal of Intelligent Manufacturing*, 34(5), pp.2079-2121. DOI: 10.1007/s10845-022-01923-2

Hu, H., Xu, J., Liu, M., and Lim, M.K., 2023. Vaccine supply chain management: An intelligent system utilizing blockchain, IoT and machine learning. *Journal of business research*, 156, p.113480. DOI: 10.1016/j.jbusres.2022.113480

Chowdhary, K.R., 2020. *Fundamentals of Artificial Intelligence*, Springer. DOI: 10.1007/978-81-322-3972-7

Sutton, R.S., and Barto, A.G., 2018, *Reinforcement learning: an introduction*, Second edition, The MIT Press, Cambridge, Massachusetts. ISBN: 9780262039246

Recommended Journal Articles:

Jimenez, A.F., Cardenas, P.F., Canales, A., Jimenez, F., and Portacio, A., 2020. A survey on intelligent agents and multi-agents for irrigation scheduling. *Computers and Electronics in Agriculture*, 176, p.105-474. DOI: 10.1016/j.compag.2020.105474

Azami, P., Jan, T., Iranmanesh, S., Ameri Sianaki, O., and Hajiebrahimi, S., 2020. Determining the optimal restricted driving zone using genetic algorithms in a smart city. *Sensors (Basel, Switzerland)*, 20(8), p.2276. DOI:10.3390/s20082276.

Dash, B., and Sharma, P., 2022. Role of artificial intelligence in smart cities for information gathering and dissemination (a review). *Academic Journal of Research and Scientific Publishing*, 4(39). DOI:10.52132/Ajrsp.e.2022.39.4

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Islam, M.R., Ahmed, M.U., Barua, S. & Begum, S., 2022. A systematic review of explainable artificial intelligence in terms of different application domains and tasks. *Applied Sciences,* 12(3), p.1353. DOI: 10.3390/app12031353

Javaid, M., Haleem, A., Singh, R.P. & Suman, R., 2022. Artificial intelligence applications for industry 4.0: A literature-based study. *Journal of Industrial Integration and Management*, 7(01), pp.83–111. DOI: 10.1142/S2424862221300040

Pallathadka, H., Ramirez-Asis, E.H., Loli-Poma, T.P., Kaliyaperumal, K., Ventayen, R.J.M. & Naved, M., 2023. Applications of artificial intelligence in business management, e-commerce and finance. *Materials Today: Proceedings*, 80, pp.2610–2613. DOI: 10.1016/j.jksuci.2024.102015

Useful Websites:

The following industry websites are useful introductory sources covering a range of information useful for this subject.

- https://www.rayven.io/
- https://aimagazine.com/
- https://www.analyticsinsight.net/magazine/
- https://news.mit.edu/topic/artificial-intelligence2

Python Resources:

https://www.python.org/ (Python Software Foundations)

Conference/ Journal Articles:

2. Artificial Intelligence and Image Processing
3. Engineering Intelligent Systems
4. Pattern Recognition

Students are encouraged to read peer-reviewed journal articles and conference papers. Google Scholar provides a simple way to broadly search for scholarly literature. From one place, you can search across many disciplines and sources: articles, theses, books, abstracts and court opinions, from academic publishers, professional societies, online repositories, universities and other web sites.

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