Unit outline

ITAI304 - Business Applications of Artificial Intelligence

Name of unit
Business Applications of Artificial Intelligence (ITAI304)

Unit description
This unit is designed to offer a comprehensive understanding of the evolving applications of Artificial Intelligence in contemporary business and industry. It encompasses a broad range of essential topics, including the foundational principles of Artificial Intelligence, deep learning, and reinforcement learning. Students will gain in-depth knowledge of how to employ these cutting-edge technologies to address intricate business challenges effectively. Furthermore, this course goes beyond technical aspects and equips students with the skills necessary to apply business design thinking. This enables them to strategically enhance and optimize business processes by applying the capabilities of AI. Students will learn how to identify opportunities for AI implementation in various business contexts, assess their potential impact, and develop actionable strategies to leverage AI for business optimization and innovation.

SECTION 1 – GENERAL INFORMATION (CORE)

1.1 Administrative details

Associated higher education awards	Duration	Level	Unit coordinator
Bachelor of Information Technology (BIT)	One semester	1st year	Sudip Laudari

1.2 Core or elective unit

Indicate if the unit is a:

☒ core unit

☐ elective unit

☐ other (please specify below):

Core unit for Bachelor of Information Technology	

1.3 Unit weighting

Using the table below, indicate the credit point weighting of this unit and the credit point total for the course of study (for example, 10 credit points for the unit and 320 credit points for the course of study).

Unit credit points	Total course credit points
10 credit points	240 credit points

1.4 Student workload

Using the table below, indicate the expected student workload per week for this unit.

No. timetabled hours per week (1)	No. personal study hours per week (2)	Total workload hours per week (3)
4 hours	6 hours	10 hours

(1) Total time spent per week at lectures, tutorials, clinical and other placements, etc.
(2) Total time students are expected to spend per week in studying, completing assignments, etc.
(3) Sum of (1) and (2) equals workload hours.

For those students requiring additional English language support, how many additional hours per week is it expected that they will undertake?

Additional English language support: __2___ hours per week

1.5 Delivery mode

Tick all applicable delivery modes for the unit and provide details in the following text box: If necessary or preferred, you may provide this information in a separate document, using the 'Attach evidence here' function of the online form.

- ☒ Face to face on site
- ☐ E-learning (online)
- ☐ Intensive/block mode (where the unit or a face to face component is delivered in a block)
- ☐ Mixed/blended
- ☐ Distance/independent learning (untimetabled)
- ☒ Full-time
- ☐ Part-time
- ☐ External

☐ Fast track

☐ Other (please specify)

1.6 Work-integrated learning activity

If the unit includes a work-integrated leaning component (where completion of the unit requires students to undertake learning in a workplace outside of their higher education provider), provide details including the rationale, the specification and methods for assessing the learning outcomes, monitoring arrangements and whether the work integrated learning is required for professional accreditation. If necessary or preferred, you may provide this information in a separate document, using the 'Attach evidence here' function of the online form.

Also if available, upload copies or templates of the formal agreements with third parties for the work-integrated learning activity, using the 'Attach evidence here' function of the online form.

Refer to the TEQSA Guidance Note on Work-Integrated Learning as required (available on the TEQSA website).

The curriculum is structured to provide a comprehensive theoretical foundation in Mathematics, with an emphasis on in-class learning, and project work. This practical engagement allows students to apply in-class learned mathematical theories to solve real-world problems in IT settings. Assessment of this component will be based on the completion of specific project objectives, with progress monitored through regular submissions and reviews.

1.7 Prerequisites and co-requisites

Are students required to have undertaken a prerequisite or co-requisite unit for this unit?

☐ Yes ☒ No

If YES, provide details of the prerequisite or co-requisite requirements below.

There are no prerequisites or co-requisites for this unit. The course is designed to provide a comprehensive introduction to the mathematical concepts essential in information technology, ensuring accessibility to students from various academic backgrounds. Fundamental mathematical skills necessary for the course will be reviewed at the outset to accommodate all learners, with additional support provided as needed to ensure every student can achieve the learning outcomes.

1.8 Other resource requirements

Do students require access to specialist facilities and/or equipment for this unit (for example, special computer access, physical education equipment)?

☒ Yes ☐ No

If YES, provide details of specialist facilities and/or equipment below.

Computers:

- Students need access to a computer laboratory equipped with workstations that have the necessary computational power to run sophisticated mathematical software and simulations used in the course.

Software and platform requirements:

- Python / R / MATLAB

SECTION 2 – ACADEMIC DETAILS (CORE)

Learning outcomes for the unit **On successful completion of this unit students will be able to:**
Evaluate the capabilities of modern AI systems against the needs of business
Assess the sustainability of AI solutions in an industry context
Describe the issues that arise in deploying AI systems as part of a larger information systems offering
Evaluate stakeholder focused AI algorithms and systems
Communicate effectively about artificial intelligence topics to experts and non-technical audiences

Week	Topics included in the unit	Assessment Tasks
1	Introduction to Mathematics in IT: An Overview	Initial quiz on AI fundamentals
2	Set Theory and Logic in Computer Science	
3	Discrete Mathematics: Combinatorics and Graph Theory	

Week	Topics included in the unit	Assessment Tasks
4	Probability and Statistics in IT	Quiz, Lab Work and Assignments - 25%
5	Linear Algebra: Matrices and Vectors in IT Application	
6	Calculus in Optimization and Modeling	
7	Algorithm Design and Analysis	Mid-Semester Exam - 20%
8	Numerical Methods and Their Applications in IT	Quiz, Lab Work and Assignments - 25%
9	Data Structures: Organizing and managing Data	
10	Cryptography: Mathematical Foundations and Applications	
11	Information Theory and Coding	
12	Mathematical Software Tools: MATLAB, R, and Python	
Exam week	Final exam	30%

Assessment tasks			
Type (1) (see examples noted below this table)	**When assessed – year, session and week (for example, year 1, semester 1, week 1)**	**Weighting (% of total marks for unit)**	**Cross reference to learning outcomes**
Weekly Tutorial Students are required to engage in hands-on programming tasks, developing and writing code to solve given problems.	Week 3-6	25%	ULO 1-3

Assessment tasks			
Type (1) **(see examples noted below this table)**	**When assessed – year, session and week** **(for example, year 1, semester 1, week 1)**	**Weighting** **(% of total marks for unit)**	**Cross reference to learning outcomes**
Mid-Semester Test Duration: 1 hour Format: Written Test The test will cover all topics taught up to the mid-semester. It aims to assess the student's understanding of the fundamental concepts.	Week 7	20%	ULO 1-3
Weekly Tutorial Students must participate in hands-on programming exercises designed to develop their coding skills. These tasks will progressively tackle more complex problems, enhancing practical abilities and reinforcing theoretical concepts learned during lectures.	Week 8 -12	25%	ULO 1-5
Final Examination Duration: 1 hour Format: Written Test The test will cover all topics. It aims to assess the students' understanding of the fundamental concepts, problem-solving skills, and programming.	Exam period	30%	ULO 1-5

(1) Examples of types of assessment tasks include: assignments; examinations; group projects; online quizzes/tests; presentations; work-based projects; and reflective journals. Ensure that details of the types of assessment tasks are included such as specific topics, duration/length/word limit of assessment and any specific formats.

2.1 Prescribed and recommended reading

Provide below, in formal reference format, a list of the prescribed and recommended reading for the unit.

Prescribed Text:

- Rosen, K. H. (2019). Discrete Mathematics and Its Applications (8th ed.). McGraw-Hill Education.

Recommended Texts:

- Stewart, J. (2019). Calculus: Early Transcendentals (8th ed.). Cengage Learning.
- Strang, G. (2019). Linear Algebra and Its Applications (5th ed.). Wellesley-Cambridge Press.
- Lay, D. C., Lay, S. R., & McDonald, J. J. (2015). Linear Algebra and Its Applications (5th ed.). Pearson.
- Grinstead, C. M., & Snell, J. L. (2012). Introduction to Probability (2nd Revised ed.). American Mathematical Society.

Reference Journals:

- SIAM Journal on Discrete Mathematics.
- The Journal of Symbolic Logic.
- Journal of Applied Mathematics and Computing.

Websites:

- Wolfram Alpha: Computational engine that can solve mathematical problems and visualize concepts.
- Project Euclid: A platform providing access to quality mathematics literature.
- GitHub: Hosts a variety of code repositories, including those related to computational mathematics and algorithms.

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