COIT20277 *Introduction to Artificial Intelligence*
Term 2 - 2019

Profile information current as at 30/04/2024 01:51 am

All details in this unit profile for COIT20277 have been officially approved by CQUniversity and represent a learning partnership between the University and you (our student). The information will not be changed unless absolutely necessary and any change will be clearly indicated by an approved correction included in the profile.

General Information

Overview

Artificial intelligence is closely related to the field called soft computing which provides a foundation for the conception, design, and deployment of intelligent systems directed towards intelligence and autonomy. This unit introduces you to the fundamental concepts of artificial intelligence in the three prominent areas of fuzzy systems, artificial neural networks, and evolutionary computation. You will be introduced to topics of genetic algorithms, evolutionary programming, and genetic programming. You will also be introduced to the most commonly used neural network paradigms. You will learn the concepts of fuzzy sets and fuzzy logic, and approximate reasoning, as part of fuzzy systems. The theoretical concepts will be reinforced with hands-on experience during computer lab tutorials.

Details

Career Level: *Postgraduate*
Unit Level: *Level 9*
Credit Points: *6*
Student Contribution Band: *8*
Fraction of Full-Time Student Load: *0.125*

Pre-requisites or Co-requisites

Pre-requisite: COIT20245 Introduction To Programming
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 - 2019

- Brisbane
- Melbourne
- Online
- 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 Postgraduate 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. **Written Assessment**
Weighting: 20%
2. **Written Assessment**
Weighting: 20%
3. **Written Assessment**
Weighting: 20%
4. **Examination**
Weighting: 40%

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 Student evaluation

Feedback
Students found this really challenging with mathematical equations.

Recommendation
Provide more explanations in lecture slides.

Unit Learning Outcomes

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

1. Model, design, and develop solutions to hypothetical problems applying the fundamental principles of evolutionary computation
2. Apply the basic concepts of artificial neural networks to create solutions to hypothetical problems
3. Analyse and solve example problems using fuzzy logic, fuzzy set theory, and approximate reasoning.

Australian Computer Society (ACS) recognises the Skills Framework for the Information Age (SFIA). SFIA is in use in over 100 countries and provides a widely used and consistent definition of ICT skills. SFIA is increasingly being used when developing job descriptions and role profiles.
This unit contributes to the following workplace skills as defined by SFIA. The SFIA code is included:

- Systems Integration (SINT)
- Programming/Software Development (PROG)
- Testing (TEST)
- Application Support (ASUP)

ACS members can use the tool MySFIA to build a skills profile at
https://www.acs.org.au/professionalrecognition/mysfia-b2c.html

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 - Written Assessment - 20%	•		
2 - Written Assessment - 20%		•	
3 - Written Assessment - 20%			•
4 - Examination - 40%	•	•	•

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes		
	1	2	3
1 - Knowledge	○	○	○
2 - Communication	○	○	○
3 - Cognitive, technical and creative skills	○	○	○
4 - Research			
5 - Self-management	○	○	○
6 - Ethical and Professional Responsibility			
7 - Leadership			
8 - 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
1 - Written Assessment - 20%	○	○	○		○			
2 - Written Assessment - 20%	○	○	○		○			
3 - Written Assessment - 20%	○	○	○		○			
4 - Examination - 40%	○	○	○					

Textbooks and Resources

Textbooks

COIT20277

Prescribed

Computational Intelligence: Concepts to Implementations
(2007)
Authors: Russell C. Eberhart, Yuhui Shi
Morgan Kaufmann Publishers
Burlington , MA , USA
ISBN: 978-1-55860-759-0
Binding: Hardcover

View textbooks at the CQUniversity Bookshop

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- R Studio and R
- Java Development Kit (JDK) 1.8 or a higher version
- NetBeans IDE 8 or a higher version

Referencing Style

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

Teaching Contacts

Ayub Bokani Unit Coordinator
a.bokani@cqu.edu.au

Schedule

Week 1 - 15 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
Evolutionary Computation Concepts and Paradigms	Chapter 2 and Part of Chapter 3	

Week 2 - 22 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
Evolutionary Algorithms	Chapter 3, and Chapter 3 from Introduction to Evolutionary Computing by A. E. Eiben and J. E. Smith	

Week 3 - 29 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
Evolutionary Computation Implementation and Genetic Algorithms	Chapters 3 and 4	

Week 4 - 05 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
Neural Networks: Components and Terminology	Chapter 5	

Week 5 - 12 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
Neural Networks: Adaptation and Learning	Chapter 5	**Assignment 1** Due: Week 5 Tuesday (13 Aug 2019) 11:59 pm AEST

Vacation Week - 19 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic

Week 6 - 26 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
Neural Networks: Adaptation	Chapter 5	

Week 7 - 02 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Neural Networks: Implementations	Chapter 6	

Week 8 - 09 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Fuzzy Systems: Fuzzy Sets and Fuzzy Logic	Chapter 7	**Assignment 2** Due: Week 8 Monday (9 Sept 2019) 11:59 pm AEST

Week 9 - 16 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Fuzzy Systems: Approximate Reasoning	Chapter 7	

Week 10 - 23 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Fuzzy Systems: Fuzzy Controller	Chapter 7	

Week 11 - 30 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Fuzzy Systems: Implementations	Chapter 8	

Week 12 - 07 Oct 2019

Module/Topic	Chapter	Events and Submissions/Topic
Performance Metrics	Chapter 10	**Assignment 3** Due: Week 12 Monday (7 Oct 2019) 11:59 pm AEST

Review/Exam Week - 14 Oct 2019

Module/Topic	Chapter	Events and Submissions/Topic

Exam Week - 21 Oct 2019

Module/Topic	Chapter	Events and Submissions/Topic

Term Specific Information

Unit Coordinator: Dr Ayub Bokani

Assessment Tasks

1 Assignment 1

Assessment Type
Written Assessment

Task Description
In this assignment you will demonstrate your ability to apply evolutionary computing concepts to hypothetical problem, and develop a software application. This assessment task is to design, code, debug, and test using the topics covered in Weeks 1-3. Further details are in the Assignment 1 Specification document available from the Unit website.

Assessment Due Date
Week 5 Tuesday (13 Aug 2019) 11:59 pm AEST

Return Date to Students
Week 7 Tuesday (3 Sept 2019)

Weighting
20%

Assessment Criteria

1. Appropriate application of evolutionary computation concepts to the given problem
2. Correct modelling of problem solution following evolutionary computation concepts
3. Effective Source code development applying correct algorithmic steps
4. Effective use of good programming practice/techniques
5. Rigorous testing to evaluate the correctness of the model and algorithm
6. Demonstration of potential practical applications in a written report

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submit only one zip file (.zip) containing the source code files (.java) and document file (.doc or .docx).

Learning Outcomes Assessed

- Model, design, and develop solutions to hypothetical problems applying the fundamental principles of evolutionary computation

Graduate Attributes

- Knowledge
- Communication
- Cognitive, technical and creative skills
- Self-management

2 Assignment 2

Assessment Type
Written Assessment

Task Description
In this assignment you will demonstrate your ability to model a neural network to solve a hypothetical problem, and develop a software application implementing your model. This assessment task is to design, code, debug, and test using the topics covered in Weeks 4-7. Further details are available in the Assignment 2 Specification document available from the Unit website.

Assessment Due Date
Week 8 Monday (9 Sept 2019) 11:59 pm AEST

Return Date to Students
Week 10 Monday (23 Sept 2019)

Weighting
20%

Assessment Criteria

1. Correct modelling of problem solution following artificial neural network concepts
2. Effective Source code development applying correct algorithmic steps
3. Effective use of good programming practice/techniques
4. Rigorous testing to evaluate the correctness of the model and algorithm
5. Demonstration of potential practical applications in a written report

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submit a zip file (.zip) containing the source code files (.java) and the report document file (.doc or .docx).

Learning Outcomes Assessed

- Apply the basic concepts of artificial neural networks to create solutions to hypothetical problems

Graduate Attributes

- Knowledge
- Communication
- Cognitive, technical and creative skills
- Self-management

3 Assignment 3

Assessment Type
Written Assessment

Task Description
In this assignment you will demonstrate your problem solving and programming skills to apply fuzzy system concepts to a hypothetical problem, and develop a software application. This assessment task is to design, code, debug, and test using the topics covered in Weeks 8-11. Further details are in the Assignment 3 Specification document available from the Unit website.

Assessment Due Date
Week 12 Monday (7 Oct 2019) 11:59 pm AEST

Return Date to Students
Exam Week Monday (21 Oct 2019)

Weighting
20%

Assessment Criteria

1. Correct modelling of problem solution following fuzzy system concepts
2. Effective Source code development for correct implementation of the model
3. Effective use of good programming practice/techniques
4. Rigorous testing to evaluate the correctness of the model and algorithm
5. Suggestions to enhance the model combining one more computational intelligence technique to improve speed/accuracy
6. Write a report on applicability of the enhanced model in real world applications that will also promote social innovation

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submit a zip file (.zip) containing the source code files (.java) and the report document file (.doc or .docx).

Learning Outcomes Assessed

- Analyse and solve example problems using fuzzy logic, fuzzy set theory, and approximate reasoning.

Graduate Attributes

- Knowledge
- Communication
- Cognitive, technical and creative skills
- Self-management

Examination

Outline
Complete an invigilated examination.

Date
During the examination period at a CQUniversity examination centre.

Weighting
40%

Length
120 minutes

Exam Conditions
Open Book.

Materials
Dictionary - non-electronic, concise, direct translation only (dictionary must not contain any notes or comments).

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