COIT12209 *Data Science*
Term 1 - 2026

Profile information current as at 16/03/2026 01:03 am

General Information

Overview
This unit focuses on the foundational concepts of data science. Digital data is growing at a very fast rate with data being the underlying driver of the knowledge economy. This unit will prepare you with foundational knowledge and practical skills about data collection, representation, storage, retrieval, management, analysis, and visualisation through the exploration of data-related challenges. You will also learn the impact of big data and business analytics on business performance to cater for the development of useful information and knowledge in an attempt to achieve data-driven decision making.

Details
Career Level: *Undergraduate*
Unit Level: *Level 2*
Credit Points: *6*
Student Contribution Band: *8*
Fraction of Full-Time Student Load: *0.125*

Pre-requisites or Co-requisites
Prerequisite: COIT11226 Systems Analysis Co-requisite: COIT11237 Database Design & Implementation
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 1 - 2026
- Brisbane
- Melbourne
- Online
- Rockhampton
- 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 Undergraduate 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. Practical Assessment
Weighting: 40%
2. Written Assessment
Weighting: 40%
3. Presentation
Weighting: 20%

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 Teaching team feedback

Feedback
The lecture on Machine Learning System Design lacks practical components.

Recommendation
Update the lecture topic “An Overview of Machine Learning System Design” to include practical components to complement theory.

Feedback from Teaching team feedback

Feedback
The unit currently lacks a hands-on example of bias in data analysis, which is important to reinforce professional data science practices.

Recommendation
Integrate a hands-on example of bias in data analysis into one of the tutorials.

Unit Learning Outcomes

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

1. Discuss and demonstrate data science foundational concepts
2. Investigate and evaluate applications for data storage, management, retrieval, and analysis and visualisation
3. Apply knowledge to process data for data driven decision making
4. Analyse and generate solutions to solve data-related challenges
5. Demonstrate the knowledge required in using data science skills to solve business problems.

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.
ACS members can use the tool MySFIA to build a skills profile at
https://www.acs.org.au/professionalrecognition/mysfia-b2c.html
This unit contributes to the following workplace skills as defined by SFIA. The SFIA code is included:
Data Management (DATM)
Business Analysis (BUAN)
Data Analysis (DTAN)
IT Operation (ITOP)

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	4	5
1 - Practical Assessment - 40%	•	•			
2 - Written Assessment - 40%		•	•	•	•

Assessment Tasks	Learning Outcomes				
	1	2	3	4	5
3 - Presentation - 20%			•	•	•

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes				
	1	2	3	4	5
1 - Communication	•	•	•	•	•
2 - Problem Solving		•	•	•	•
3 - Critical Thinking	•	•	•	•	•
4 - Information Literacy			•		•
5 - Team Work				•	
6 - Information Technology Competence				•	•
7 - Cross Cultural Competence					•
8 - Ethical practice	•	•			
9 - Social Innovation			•		•
10 - First Nations Knowledges					
11 - 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	9	10	11
1 - Practical Assessment - 40%	•		•	•		•					
2 - Written Assessment - 40%	•	•	•	•		•		•	•		
3 - Presentation - 20%	•	•		•							

Textbooks and Resources

Textbooks

COIT12209

Supplementary

Data Science from Scratch: First Principles with Python
Edition: 2nd (2019)
Authors: Grus, Joel
O'Reilly
ISBN: 9781492041139

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- Zoom capacity (webcam and microphone) will be required for online students
- Visual Studio Code (latest version)
- Anaconda Data Science Platform (Individual - Free Distribution)
- Python 3.10 (or higher)

Referencing Style

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

Teaching Contacts

Arjun Neupane Unit Coordinator
a.neupane@cqu.edu.au
Ahsan Morshed Unit Coordinator
a.morshed@cqu.edu.au

Schedule

Week 1 - 09 Mar 2026

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to Data Science: What is data science; data domination; innovation from internet giants; data science history; data science in modern enterprises; soft skills of a data scientist; data science project life cycle; types of data; big data; how is big data different.	Supplementary materials	

Week 2 - 16 Mar 2026

Module/Topic	Chapter	Events and Submissions/Topic
Identifying Data Problems: From business problems to data mining tasks; data mining tasks; data collection; business use cases; sampling; data mining process.	Supplementary materials	

Week 3 - 23 Mar 2026

Module/Topic	Chapter	Events and Submissions/Topic

Ethical and Professional Data Science Practices	Supplementary materials	

Week 4 - 30 Mar 2026

Module/Topic	Chapter	Events and Submissions/Topic
Data Presentation: Understand different ways of summarisng data; choose the right table/ graph for the right data and audience; self explanatory graphics; attractive graphs and tables.	Supplementary materials	

Week 5 - 06 Apr 2026

Module/Topic	Chapter	Events and Submissions/Topic
Data Analytics: Why analytics; different types of analytics; delivery methods for the operational users; holistic approach to expand enterprise analytics; value of integration and data quality to analytics.	Supplementary materials	

Week 6 - 13 Apr 2026

Module/Topic	Chapter	Events and Submissions/Topic
Exploratory Analysis: trend analysis; Box plot; pairs plot; time series decomposition; geographical analysis.	Supplementary materials	Assessment 1 Practical Assessment Due: Week 6 Friday (17 Apr 2026) 11:45 pm AEST

Vacation Week - 20 Apr 2026

Module/Topic	Chapter	Events and Submissions/Topic

Week 7 - 27 Apr 2026

Module/Topic	Chapter	Events and Submissions/Topic
Data Discovery and Data Mining: Data driven decisions; enabling data driven innovations; knowledge discovery process; data cleaning; data integration; data selection; data transformation; knowledge based systems; data mining and its goals; data mining operation and process.	Supplementary materials	

Week 8 - 04 May 2026

Module/Topic	Chapter	Events and Submissions/Topic
Analytic Algorithms: clustering analysis; regression analysis; classifier analysis; association analysis; cohort analysis; graph analysis; traverse pattern analysis.	Supplementary materials	

Week 9 - 11 May 2026

Module/Topic	Chapter	Events and Submissions/Topic
Data Integration: Analytic data integration; challenges in data integration; technologies in data integration; data mapping; data staging; data extraction; data transformation; data loading; need for integration; data integration approaches.	Supplementary materials	

Week 10 - 18 May 2026

Module/Topic	Chapter	Events and Submissions/Topic

Data Security and Privacy: protection of personal data; data collection and significant risks; challenges of big data for data protection; confidentiality; integrity; availability; middleware security concerns; built in database protection; privacy issues; data security and storage; identification and authentication.	Supplementary materials	

Week 11 - 25 May 2026

Module/Topic	Chapter	Events and Submissions/Topic
System Design: An overview of ML systems in the real world	Supplementary materials	Assessment 2 Written Assessment Due: Week 11 Friday (29 May 2026) 11:45 pm AEST

Week 12 - 01 Jun 2026

Module/Topic	Chapter	Events and Submissions/Topic
Cloud Computing for Data Processing	Supplementary materials	Assessment 3 Presentation Due: Week 12 Monday (1 June 2026) 11:45 pm AEST

Exam Week - 08 Jun 2026

Module/Topic	Chapter	Events and Submissions/Topic

Vacation/Exam Week - 15 Jun 2026

Module/Topic	Chapter	Events and Submissions/Topic

Term Specific Information

Unit Coordinator: Dr Arjun Neupane, Building 30/G.09, Rockhampton Campus Email: a.neupane@cqu.edu.au (Preferred Contact) Telephone: (07) 49309558

Assessment Tasks

1 Practical Assessment

Assessment Type
Practical Assessment

Task Description
This assessment is designed to reinforce the contents taught in Week 1 to Week 5. This assessment relates to Learning Outcomes 1 and 2. This assessment is an individual assessment. This task will help to build your knowledge of data formats, retrieval, and analysis techniques. This assessment contributes to 40% of the total marks.
AI ASSESSMENT SCALE - AI PLANNING
You may use AI for planning, idea development, and research. Your final submission should show how you have developed and refined these ideas.

Assessment Due Date
Week 6 Friday (17 Apr 2026) 11:45 pm AEST

Return Date to Students

Within two weeks of submission

Weighting
40%

Assessment Criteria
The assessment will be marked based on the following criteria:
- Quality of source code

Submitted screen shot of outputs
Analysis presented on the generated output
Well-structured and coherent report
More details will be available on the Moodle site.

Referencing Style
- Harvard (author-date)

Submission
Online

Submission Instructions
All files must be submitted to Moodle for marking by the due date.

Learning Outcomes Assessed
- Discuss and demonstrate data science foundational concepts
- Investigate and evaluate applications for data storage, management, retrieval, and analysis and visualisation

Graduate Attributes
- Communication
- Critical Thinking
- Information Literacy
- Information Technology Competence

2 Written Assessment

Assessment Type
Written Assessment

Task Description
This assessment is based on a case study to be provided to you in teaching Week 6. You are required to write a report of 2000 words. This is an individual assessment and contributes to Learning Outcomes 2, 3, 4 and 5. This report will follow a standard business report format. You will investigate and advise an organisation, whose details are given in the case study, on data storage, retrieval, and analysis mechanisms. This assessment contributes to 40% of the total marks.
AI ASSESSMENT SCALE - AI PLANNING
You may use AI for planning, idea development, and research. Your final submission should show how you have developed and refined these ideas.

Assessment Due Date
Week 11 Friday (29 May 2026) 11:45 pm AEST

Return Date to Students

Feedback and marks for this assessment will be released after the certification date as this unit does not have an exam.

Weighting
40%

Assessment Criteria
The assessment will be marked based on the following criteria:
Report formatting (font, header and footer, table of contents, numbering, referencing)
Professional communication (correct spelling, grammar, formal business language used)
Executive summary
Report introduction
Data collection and storage
Data in action
Model design and implementation
Conclusion and recommendations
More details will be available on the Moodle site.

Referencing Style
- Harvard (author-date)

Submission
Online

Submission Instructions
The assignment must be submitted to Moodle for marking by the due date.

Learning Outcomes Assessed
- Investigate and evaluate applications for data storage, management, retrieval, and analysis and visualisation

- Apply knowledge to process data for data driven decision making
- Analyse and generate solutions to solve data-related challenges
- Demonstrate the knowledge required in using data science skills to solve business problems.

Graduate Attributes
- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Information Technology Competence
- Ethical practice
- Social Innovation

3 Presentation

Assessment Type
Presentation

Task Description
This assessment contributes to the Learning Outcomes 3, 4 and 5. This is an individual recorded presentation. The presentation topic is based on your report from assignment 2 and learning outcomes from this unit. You will need to record and submit a 5-7 minutes video presentation explaining the key concepts. Your recorded video should include both the presenter and your desktop within the frame. Please ensure you adhere to appropriate and professional dress codes for your presentation.
AI ASSESSMENT SCALE - AI PLANNING
You may use AI for planning, idea development, and research. Your final submission should show how you have developed and refined these ideas.

Assessment Due Date
Week 12 Monday (1 June 2026) 11:45 pm AEST

The 5-7 minutes video presentation must be submitted by the due date before the in-class presentation to be held on Week 12 tutorial times.

Return Date to Students

Feedback and marks for this assessment will be released after the certification date as this unit does not have an exam.

Weighting
20%

Assessment Criteria
The assessment will be marked based on the following criteria:
Presentation structure (Introduction, body, conclusion)
Delivery
Presentation slides

More details including a sample marksheet will be available on the Moodle site.

Referencing Style
- Harvard (author-date)

Submission
Online

Submission Instructions
The presentation file must be submitted to Moodle by the due date.

Learning Outcomes Assessed
- Apply knowledge to process data for data driven decision making
- Analyse and generate solutions to solve data-related challenges
- Demonstrate the knowledge required in using data science skills to solve business problems.

Graduate Attributes
- Communication
- Problem Solving
- Information Literacy

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