



SCIE11024 *Science Investigation*

Term 2 - 2017

Profile information current as at 29/04/2024 12:33 am

All details in this unit profile for SCIE11024 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

This unit provides students with essential theoretical knowledge and practical skills for developing, conducting, and communicating scientific research. Students will study fundamental scientific theory, including the derivation of testable hypotheses, ideal sampling methodology and elementary methods of graphing and data analysis. Students will liaise with academic staff throughout term to design and conduct a scientific experiment based on their area of interest. They will then be guided through the analysis, interpretation and presentation of their results.

Details

Career Level: *Undergraduate*

Unit Level: *Level 1*

Credit Points: 6

Student Contribution Band: 8

Fraction of Full-Time Student Load: 0.125

Pre-requisites or Co-requisites

There are no requisites for this unit.

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 - 2017

- Bundaberg
- Distance
- Rockhampton

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).

Residential Schools

This unit has a Compulsory Residential School for distance mode students and the details are:

Click here to see your [Residential School Timetable](#).

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. **Written Assessment**

Weighting: 10%

2. **Practical and Written Assessment**

Weighting: 30%

3. **Presentation**

Weighting: 20%

4. **Written Assessment**

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 Have your say

Feedback

The res school class size was too big for the classroom

Recommendation

Timetabled classrooms were based on last years student numbers, which were much larger this year. If numbers are large again we will consider running an additional residential school, having additional staff, and/or request a larger space.

Feedback from Have your say

Feedback

There was a request for other science disciplines to be used as examples in Lectures & Res Schools ie. Chemistry or Physics not just Biology.

Recommendation

We will adapt lecture content to be more balanced between physics, chemistry and biology. We will consider the practicalities of additional projects with a chemistry and physics focus for next year.

Feedback from Have your say

Feedback

Some students believed that the hypothesis development in the residential school was a trial by fire.

Recommendation

Hypothesis development is covered in depth in the lectures. The first assessment, which we run early in the course specifically tests hypothesis forming.

Feedback from Have your say

Feedback

Additional weekly resources such as tutorials and links to supplementary information would be helpful.

Recommendation

We will consider the need for additional tutorials (for example an interactive activity on forming hypotheses). Weekly links to supplementary information will be provided to extend potential learning of high ability students.

Feedback from Have your say

Feedback

There is overlap of course information with Statistics

Recommendation

The contents and student overlap with the Statistics course will be reviewed and where necessary the information will be made complimentary rather than repetitive, with the exception of key concepts where repetition may be valuable for learning.

Unit Learning Outcomes

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

1. Develop a plan to address a theoretical or practical research question.
2. Select and utilise appropriate sampling methods and equipment to undertake a scientific investigation.
3. Analyse information gathered during a science investigation to reach conclusions that address the investigation's research question.
4. Demonstrate project and time management skills by making efficient use of resources to complete a field investigation in a timely manner.
5. Communicate the outcomes of the science investigation in an appropriate format for the target audience.

Alignment of Learning Outcomes, Assessment and Graduate Attributes

 N/A Level	 Introductory Level	 Intermediate Level	 Graduate Level	 Professional Level	 Advanced Level
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Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes				
	1	2	3	4	5
1 - Written Assessment - 10%	•	•			
2 - Practical and Written Assessment - 30%		•	•	•	
3 - Presentation - 20%			•	•	•
4 - Written Assessment - 40%			•	•	•

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 - 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
1 - Written Assessment - 10%	•	•	•	•						

Assessment Tasks	Graduate Attributes									
	1	2	3	4	5	6	7	8	9	10
2 - Practical and Written Assessment - 30%	•		•	•		•				
3 - Presentation - 20%	•	•	•	•		•				
4 - Written Assessment - 40%	•	•		•						

Textbooks and Resources

Textbooks

There are no required textbooks.

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)

Referencing Style

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

Teaching Contacts

Andrew Irving Unit Coordinator

a.irving@cqu.edu.au

Leigh Stitz Unit Coordinator

l.stitz@cqu.edu.au

Schedule

Week 1 - 10 Jul 2017

Module/Topic	Chapter	Events and Submissions/Topic
Unit overview What is science?		

Week 2 - 17 Jul 2017

Module/Topic	Chapter	Events and Submissions/Topic
A (brief) history of modern scientific philosophy		

Week 3 - 24 Jul 2017

Module/Topic	Chapter	Events and Submissions/Topic
The logic of scientific discovery		

Week 4 - 31 Jul 2017

Module/Topic	Chapter	Events and Submissions/Topic
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From observation to hypothesis: The scientific framework.
Part 1: Making scientific observations

Week 5 - 07 Aug 2017

Module/Topic	Chapter	Events and Submissions/Topic
From observation to hypothesis: The scientific framework. Part 2: Numerous competing models Part 3: Deriving logical and testable hypotheses		

Vacation Week - 14 Aug 2017

Module/Topic	Chapter	Events and Submissions/Topic
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Week 6 - 21 Aug 2017

Module/Topic	Chapter	Events and Submissions/Topic
Acquiring the evidence: Accounting for variation, & Sampling to test mensurative hypotheses		Exercises in logical thought Due: Week 6 Monday (21 Aug 2017) 11:45 pm AEST

Week 7 - 28 Aug 2017

Module/Topic	Chapter	Events and Submissions/Topic
Designing experiments to test manipulative hypotheses		

Week 8 - 04 Sep 2017

Module/Topic	Chapter	Events and Submissions/Topic
Interpreting data using basic probability theory		ROCKHAMPTON Tues 5th - Thurs 7th Sep: Compulsory Residential School (including assessment of Project oral presentation on the 11th of September). Online sampling practicals Due: Week 8 Monday (4 Sept 2017) 11:45 pm AEST

Week 9 - 11 Sep 2017

Module/Topic	Chapter	Events and Submissions/Topic
Formal statistical data analysis: The need for objective evidence		BUNDABERG Tues 12th - Thurs 14th Sep: Compulsory Residential School (including assessment of Project oral presentation on the 15th of September).

Week 10 - 18 Sep 2017

Module/Topic	Chapter	Events and Submissions/Topic
Graphs: How best to present your data		

Week 11 - 25 Sep 2017

Module/Topic	Chapter	Events and Submissions/Topic
The style of scientific writing		

Week 12 - 02 Oct 2017

Module/Topic	Chapter	Events and Submissions/Topic
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Review lecture - Q&A.

Use this final lecture period to ask questions about any of the course content you'd like to review. You may also find it useful to bring questions relating to your residential school report.

Review/Exam Week - 09 Oct 2017

Module/Topic	Chapter	Events and Submissions/Topic
		Project written report Due: Review/Exam Week Monday (9 Oct 2017) 11:45 pm AEST

Exam Week - 16 Oct 2017

Module/Topic	Chapter	Events and Submissions/Topic
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Term Specific Information

This unit comprises a series of lectures, online (Moodle) tutorials, and a compulsory residential school. Two residential schools are offered (Bundaberg and Rockhampton), but you only need to attend one of these. Please attend whichever is the most convenient for you. Detailed information about residential school tasks and assessment will be provided in lecture and on the Moodle site at the beginning of term.

Associate Professor Andrew Irving is the unit coordinator and can be reached via email (a.irving@cqu.edu.au), phone: (07) 4930 9013, or in his office in Rockhampton (CQIRP, Building 361, Room G.39).

Assessment Tasks

1 Exercises in logical thought

Assessment Type

Written Assessment

Task Description

Assessment Aim

The aim of this assessment is to develop your skills in deriving logical and testable hypotheses from numerous competing models that account for a quantified observation.

Assessment Description

This assignment comprises of eight (8) short answer questions designed to test your understanding of the scientific framework and to engage logical thought processes.

Assessment Due Date

Week 6 Monday (21 Aug 2017) 11:45 pm AEST

Answers are to be presented in a word document and submitted via Moodle.

Return Date to Students

Monday (4 Sept 2017)

Return via Moodle

Weighting

10%

Minimum mark or grade

Students must achieve a mark of 40% or higher in this assessment task to pass this unit

Assessment Criteria

Assessment criteria will include evidence of understanding and correctly applying different types of logical thought, with a particular emphasis on falsification theory used to test scientific hypotheses. Clear, unambiguous writing skills (e.g. plain English with good grammar) will be necessary.

The assessment item will be marked against the following criteria:

1. Correctly applying logical thought to problem-solve.
2. Correct use of falsification theory.

3. Correct derivation of all elements of the scientific framework (observations, models, and hypotheses).
4. Use of unambiguous writing skills (e.g. plain English with good grammar).

Referencing Style

- [Harvard \(author-date\)](#)

Submission

Online

Submission Instructions

Submit using the relevant assessment link on the unit Moodle page

Learning Outcomes Assessed

- Develop a plan to address a theoretical or practical research question.
- Select and utilise appropriate sampling methods and equipment to undertake a scientific investigation.

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy

2 Online sampling practicals

Assessment Type

Practical and Written Assessment

Task Description

Assessment Aim

The aim of these four online practicals is to apply your knowledge from the lectures and acquire skills in sampling design, which will be useful in the residential school.

Assessment Description

Students are required to complete a series of four online practicals:

1. Practical 1: Sampling unit size
2. Practical 2: Replication
3. Practical 3: Clumped versus Random Distribution
4. Practical 4: Stratified sampling

Each practical requires not only doing the practical work but also providing a short written summary of what was learned for assessment.

Assessment Due Date

Week 8 Monday (4 Sept 2017) 11:45 pm AEST

Submit via Moodle

Return Date to Students

Week 10 Friday (22 Sept 2017)

Return via Moodle

Weighting

30%

Minimum mark or grade

A minimum mark of 40% for this assessment item is required to pass this unit

Assessment Criteria

Assessment for this task is based on the following:

- Practical skills: following methods provided and acquiring data correctly.
- Mathematical skills: following instructions to calculate summary statistics from acquired data.
- Communication skills: writing a summary report of each practical, which demonstrates a sound understanding of the theoretical principles taught in each practical.

Referencing Style

- [Harvard \(author-date\)](#)

Submission

Online

Submission Instructions

Submit using the relevant assessment link on the unit Moodle page

Learning Outcomes Assessed

- Select and utilise appropriate sampling methods and equipment to undertake a scientific investigation.
- Analyse information gathered during a science investigation to reach conclusions that address the investigation's research question.
- Demonstrate project and time management skills by making efficient use of resources to complete a field investigation in a timely manner.

Graduate Attributes

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

3 Project oral presentation

Assessment Type

Presentation

Task Description**Task Aim**

The aim of this task is to improve your scientific written and oral communication skills and develop your capacity to consider and satisfactorily answer questions relating to the logic, design, sampling, analysis, and reporting of a research project.

Task Description

This assessment task (and the final assessment task of a written report) is based on your residential school project. Early in term, students will choose a research project that aligns with their interests from a prescribed list, and will then be placed into a team based on their project preference. At the end of the residential school, each research team will be required to prepare and deliver an oral defence of their research project, including powerpoint slides. Following the presentation, students will need to answer audience questions regarding decisions behind the design, analysis and interpretation of their experiment, as well as general questions relating to the research topic. As such attendance at the Residential School is mandatory.

Details of the oral presentation:

- Final day of residential school in Rockhampton
- 8-10 powerpoint slides.
- Maximum of 10 minutes plus 5 minutes question time.
- Presented as a group.
- A template slide presentation will be provided.

Assessment Due Date

Note that oral presentations will be given on the final day of each residential school (Rockhampton, 7th Sept and Bundaberg, 14th Sept)

Return Date to Students

Week 10 Friday (22 Sept 2017)

Return grade via Moodle

Weighting

20%

Minimum mark or grade

Students must achieve a mark of 40 % or higher in this assessment task to pass this unit

Assessment Criteria

Assessment for this task will be based on:

- Content: Are the slides clearly presented, logically ordered, well organized and pleasing to the eye? Do the slides present all the relevant information needed to understand the research project, including the reason(s) for doing the experiment, and any conclusions?
- Style: Do the speakers present the research clearly and confidently, demonstrating a sound grasp of the

hypothesis and reasoning behind the methodology? Do the speakers present the research at an appropriate pace and keep on time? Do the speakers make good eye contact and engage with the audience?

- Questions: Are questions and criticisms of the research project adequately considered and answered? Are the speakers able to place their results in a broader context to explain their significance? Do the speakers recognize possible improvements to the experimental design, including new ideas that have emerged while doing the research?

Referencing Style

- [Harvard \(author-date\)](#)

Submission

Offline Group

Submission Instructions

Presentations will be given in person on the final day of each residential school

Learning Outcomes Assessed

- Analyse information gathered during a science investigation to reach conclusions that address the investigation's research question.
- Demonstrate project and time management skills by making efficient use of resources to complete a field investigation in a timely manner.
- Communicate the outcomes of the science investigation in an appropriate format for the target audience.

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Information Technology Competence

4 Project written report

Assessment Type

Written Assessment

Task Description

Task Aim

The aim of this task is to improve your scientific written communication skills and develop your skills in presenting the logic, design, sampling, analysis, and results of a research project. The task will encourage you to research a topic in more detail and hone your writing skills to be more concise.

Task Description

The practical assessment will be a written report based on the project completed during the residential school. As such attendance at the Residential School is mandatory.

- Prepared in the format of a scientific journal article (a template will be provided).
- Prepared either as an individual or in a group (note that group reports will mean each student in that group receives the same mark for their report).
- Maximum of 2500 words
- Minimum of 10 references.

Assessment Due Date

Review/Exam Week Monday (9 Oct 2017) 11:45 pm AEST

Submit via Moodle

Return Date to Students

Exam Week Friday (20 Oct 2017)

Return via Moodle

Weighting

40%

Minimum mark or grade

Students must achieve a mark of 40 % or higher in this assessment task to pass this unit

Assessment Criteria

The assessment will be marked on specific criteria relating to:

- **Abstract** (clear, concise summary of context, hypothesis, results and conclusions)
- **Introduction** (Relevant context provided, starting with a broad focus of observations and models and narrowing to a clear, well-articulated hypothesis for a manipulative experiment)
- **Methods** (adequate description and justification of methods used so experiment could be repeated)
- **Results** (Concise description of results, ordered logically and presented in graphs/tables, as well as basic statistical analyses)
- **Discussion** (Logical structure that discusses the key results and their meaning before placing results in a broader context and identifying biases/improvements/further fields of study etc)
- **References** (cited appropriately throughout text, 10 minimum, no web pages unless data repository-type)
- **Spelling & grammar**
- **Word count** (keeping to guidelines in each section).

Referencing Style

- [Harvard \(author-date\)](#)

Submission

Online

Submission Instructions

Submit using the relevant assessment link on the unit moodle page

Learning Outcomes Assessed

- Analyse information gathered during a science investigation to reach conclusions that address the investigation's research question.
- Demonstrate project and time management skills by making efficient use of resources to complete a field investigation in a timely manner.
- Communicate the outcomes of the science investigation in an appropriate format for the target audience.

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