



# SCIE11024 *Science Investigation*

## Term 2 - 2018

Profile information current as at 29/04/2024 06:39 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 - 2018

- 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 Moodle feedback

##### **Feedback**

Students appreciated the structure of the residential school, being able to link the learning outcomes from prior assessments to aid them in their residential school project.

##### **Recommendation**

Retain current assessment structure and links.

#### Feedback from Moodle feedback

##### **Feedback**

Students noted a need for greater individualised feedback for assessment items, in addition to the class-level feedback.

##### **Recommendation**

Individual feedback is usually a hallmark of this unit, yet with the sudden change in coordinator at a crunch time of term, there simply wasn't enough time to provide individual written feedback and return assessments on time for all students. Students were encouraged to seek verbal feedback, and some took up this offer. The high level of individual feedback will return in the next offering.

#### Feedback from Moodle feedback.

##### **Feedback**

One student raised the question of why there were limited additional readings/references for the unit.

##### **Recommendation**

Additional supporting content has typically been provided through short pre-recorded 'tutorial-style' videos via Moodle, given the ease with which this fits the mixed-mode offering at CQU. Additional written readings/references will be included for the next offering to further improve the unit content accessibility.

#### Feedback from Moodle feedback

##### **Feedback**

As in 2016, students called for a greater diversity of research projects.

##### **Recommendation**

A chemistry-themed project was included in the 2016 offering, and further development of these new projects will continue for 2017 to cater to a broader range of scientific interests among the students.

## 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



## 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%	•	•	•	•						
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](mailto:a.irving@cqu.edu.au)

## Schedule

### Week 1 - 09 Jul 2018

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

### Week 2 - 16 Jul 2018

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

### Week 3 - 23 Jul 2018

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

### Week 4 - 30 Jul 2018

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

### Week 5 - 06 Aug 2018

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 - 13 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic
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**Exercises in logical thought** Due:  
Vacation Week Friday (17 Aug 2018)  
11:45 pm AEST

#### Week 6 - 20 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic
Acquiring the evidence: Accounting for variation & sampling to test mensurative hypotheses		

#### Week 7 - 27 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic
Designing experiments to test manipulative hypotheses		<b>Online sampling practicals</b> Due: Week 7 Friday (31 Aug 2018) 11:45 pm AEST

#### Week 8 - 03 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
Interpreting data using basic probability theory		

#### Week 9 - 10 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
Formal statistical data analysis: The need for objective evidence		ROCKHAMPTON Tues 11th - Thurs 13th Sep: Compulsory Residential School (including assessment of Project oral presentation on the 13th of September).  <b>Project oral presentation</b> Due: Week 9 Thursday (13 Sept 2018) 2:00 pm AEST

#### Week 10 - 17 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
NO LECTURE SCHEDULED		BUNDABERG Tues 18th - Thurs 20th Sep: Compulsory Residential School (including assessment of Project oral presentation on the 20th of September).

#### Week 11 - 24 Sep 2018

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

#### Week 12 - 01 Oct 2018

Module/Topic	Chapter	Events and Submissions/Topic
The style of scientific writing		<b>Project written report</b> Due: Week 12 Friday (5 Oct 2018) 11:45 pm AEST

#### Review/Exam Week - 08 Oct 2018

Module/Topic	Chapter	Events and Submissions/Topic
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#### Exam Week - 15 Oct 2018

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](mailto: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

The aim of this assessment is to develop your skills in deriving logical and testable hypotheses from numerous competing models (explanations) that account for a quantified observation. This assignment comprises eight short-answer questions designed to test your understanding of the scientific framework and to engage logical thought processes.

#### Assessment Due Date

Vacation Week Friday (17 Aug 2018) 11:45 pm AEST

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

#### Return Date to Students

Week 7 Friday (31 Aug 2018)

Return via Moodle

#### Weighting

10%

#### Minimum mark or grade

40%

#### Assessment Criteria

Assessment criteria will include evidence of understanding and correct application of 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

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.

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

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

Each practical requires not only doing the practical work (i.e. acquiring the data), but also providing, for assessment, a short written summary of what was learned.

### Assessment Due Date

Week 7 Friday (31 Aug 2018) 11:45 pm AEST

Submit via Moodle

### Return Date to Students

Week 9 Friday (14 Sept 2018)

Return via Moodle

### Weighting

30%

### Minimum mark or grade

40%

### 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

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.

This assessment task (and the final assessment task of a written report) is based on your residential school project. Early in term, you will choose a research project from a prescribed list, and will then form a team with other students who choose the same project. At the end of the residential school, your team will be required to prepare and deliver an oral defence of its research project, including PowerPoint slides. Following the presentation, team members will need to answer audience questions regarding decisions behind the design, analysis and interpretation of the results of your experiment, as well as general questions relating to the research topic. Consequently, attendance at the residential school is mandatory.

Details of the oral presentation:

- To be presented on the final day of the residential school;
- 8-10 PowerPoint slides;
- Maximum of 10 minutes plus 5 minutes question time;
- Presented as a group;
- A template for your slide presentation will be provided on Moodle.

### Assessment Due Date

Week 9 Thursday (13 Sept 2018) 2:00 pm AEST

Note that oral presentations will be given on the final day of each residential school (Rockhampton, 13th Sept and Bundaberg, 20th Sept)

### Return Date to Students

Week 10 Friday (21 Sept 2018)

Return grade via Moodle

### Weighting

20%

### Minimum mark or grade

40 %

### Assessment Criteria

Assessment for this task will be based on:

- Content: Are the slides clearly presented, logically ordered, well organised 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 recognise possible improvements to the experimental design, including new ideas that have emerged while doing the research?

### Referencing Style

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

### Submission

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**

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.

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. The report will be:

- Prepared in the format of a scientific journal article (a template will be provided);
- Prepared as a group (each student in that group receives the same mark for their report);
- Maximum of 2500 words;
- Minimum of 10 references to support statements made in the report.

The written report will constitute 80 % of your mark for this assessment item, with the remaining 20 % based on an online Self-and-Peer Assessment (SPA) task designed to indicate your individual performance and contribution to your residential school project, as well as that of each of your project team members. A link to the SPA will be emailed to you near the end of term, and will be based on a Likert classification allowing you to rank your level of agreement with the questions asked.

### **Assessment Due Date**

Week 12 Friday (5 Oct 2018) 11:45 pm AEST

Submission via Moodle

### **Return Date to Students**

Exam Week Friday (19 Oct 2018)

Return via Moodle

### **Weighting**

40%

### **Minimum mark or grade**

40 %

### **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 (clear and succinct use of English);
- 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