



EDCU13017 Chemical and Physical Sciences

Term 2 - 2022

Profile information current as at 05/05/2024 06:46 pm

All details in this unit profile for EDCU13017 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

In Chemical and Physical Sciences, students apply theoretical concepts and current research related to teaching and learning in Science to engage in authentic evaluation and pedagogical design practices. Chemical and Physical Sciences examines both theoretical perspectives and the content and pedagogy required to teach Science in Primary and Early Childhood classrooms. Students develop understanding of the content and structure of these two strands in the Australian Curriculum and build on the knowledge and skills they developed in the Biological and Earth and Space Science unit to further examine views around best practice in Science pedagogy linked to current research. Chemical and Physical Sciences includes an emphasis on assessment practices in Science which can be applied to other strands of this learning area. Planning to teach and assess students' understanding of Science is addressed with an emphasis on how best to engage students in this learning area and scaffold understanding to enhance the ability to provide scientific explanations for phenomena.

Details

Career Level: *Undergraduate*

Unit Level: *Level 3*

Credit Points: 6

Student Contribution Band: 7

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 - 2022

- Bundaberg
- Cairns
- Mackay
- Mixed Mode
- Online
- Rockhampton
- Townsville

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: 50%

2. **Practical and Written Assessment**

Weighting: 50%

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 Self-reflection

Feedback

Updated Australian Curriculum

Recommendation

Monitor changes to the new Australian Curriculum in 2022 and amend unit content accordingly.

Feedback from Student feedback

Feedback

Weekly science experiments

Recommendation

Continue and expand emphasis on weekly Chemical and Physical science experiments.

Unit Learning Outcomes

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

1. Evaluate examples of teaching and assessment practice in Science to identify how connections are made to students' prior knowledge or experience to promote learning
2. Access and apply professional literature on contemporary Science education to critically evaluate or justify planning and assessment practices
3. Plan lesson sequences that use appropriate research-based teaching strategies and ICTs to structure content and address students' possible misconceptions in Science
4. Develop diagnostic, formative and summative assessment tools that identify students' understanding of scientific phenomena
5. Select assessment strategies that engage students in active learning, promote higher order thinking and scaffold students' understanding of core concepts in the areas of Chemical and Physical sciences.

Successful completion of this unit provides opportunities for students to engage with the Australian Professional Standards for Teachers (Graduate Career Stage) focus areas of:

- 1.1 Physical, social and intellectual development and characteristics of students
- 1.2 Understand how students learn
- 2.1 Content and teaching strategies of the teaching area
- 2.2 Content selection and organisation
- 2.3 Curriculum, assessment and reporting
- 2.6 Information and Communication Technology (ICT)
- 3.2 Plan, structure and sequence learning programs
- 3.3 Use teaching strategies
- 3.4 Select and use resources
- 3.6 Evaluate and improve teaching programs
- 4.1 Support student participation
- 5.1 Assess student learning
- 5.4 Interpret student data

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 - 50%	•	•	•	•	
2 - Practical and Written Assessment - 50%	•	•		•	•

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 - Practical Assessment - 50%		•	•	•		•	•			
2 - Practical and Written Assessment - 50%	•	•	•	•						

Module/Topic	Chapter	Events and Submissions/Topic
--------------	---------	------------------------------

Pedagogical frameworks in science	Skamp, K. & Preston, C. (2021). Chapter 2 – Constructivist views of learning and teaching science. In K. Skamp and C. Preston (Eds.), <i>Teaching primary science constructively / edited by Keith Skamp and Christine Preston</i> . (7th edition, pp. 42-76). Cengage. Preston, C., Mules, M., Baker, D., & Frost, K. (2007). Teaching primary science constructively: Experiences of pre-service teachers at Macquarie University: Part 2. <i>Teaching Science</i> , 53(2), 29-32.
-----------------------------------	---

Week 2 - Scientific investigation processes - 18 Jul 2022

Module/Topic	Chapter	Events and Submissions/Topic
Scientific investigation processes	Skamp, K. & Preston, C. (2021). Chapter 4 – Thinking and working scientifically. In K. Skamp and C. Preston (Eds.), <i>Teaching primary science constructively / edited by Keith Skamp and Christine Preston</i> . (7th edition, pp. 142-186). Cengage. Conezio, & French, L. (2002). Science in the preschool classroom: Capitalizing on children's fascination with the everyday world to foster language and literacy development. <i>Young Children</i> , 57(5), 12-18.	

Week 3 - Chemical sciences sub-strand overview - 25 Jul 2022

Module/Topic	Chapter	Events and Submissions/Topic
Chemical sciences sub-strand overview Misconceptions in Science	Kind, V. (2004). Beyond Appearances: Students' misconceptions about basic chemical ideas. (2nd Edition). http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.588.2108&rep=rep1&type=pdf Elliott, & Pillman, A. (2016). Making science misconceptions work for us. <i>Teaching Science</i> , 62(1), 38-41. https://doi.org/10.3316/aeipt.214741	

Week 4 - Physical sciences sub-strand overview - 01 Aug 2022

Module/Topic	Chapter	Events and Submissions/Topic
Physical sciences sub-strand overview and Assessment in Science	Barke, Hazari, A., & Yitbarek, S. (n.d.). Students' Misconceptions and How to Overcome Them. In <i>Misconceptions in Chemistry</i> (pp. 21-36). https://doi.org/10.1007/978-3-540-70989-3_3 Ciofalo, J.F. & Wylie, E.C. (2006). Using diagnostic classroom assessment: One question at a time. <i>Teachers College Record</i> . http://mrbaronmaths.com/resourcesnew/8.%20Research/Formative%20Assessment/Using%20Diagnostic%20Classroom%20Assessment.pdf	

Week 5 - Assessment in science - 08 Aug 2022

Module/Topic	Chapter	Events and Submissions/Topic
Assessment in science	Hodgson, C. & Pyle, K. (2010). <i>A literature review of assessment for learning in science</i> . http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.471.3251&rep=rep1&type=pdf	Assessment Task 1 Due Thursday 12th August 2021 11:45 PM AEST Scientific Concepts and Alternate Conceptions Due: Week 5 Friday (12 Aug 2022) 11:45 pm AEST

Vacation Week - 15 Aug 2022

Module/Topic	Chapter	Events and Submissions/Topic
--------------	---------	------------------------------

Week 6 - Chemical sciences content (1/3) - 22 Aug 2022

Module/Topic	Chapter	Events and Submissions/Topic
Chemical sciences content (1/3)	<p>Etherington, M. (2011). Investigative primary science: A problem-based learning approach. <i>The Australian Journal of Teacher Education</i>, 36(9), 36-57.</p> <p>Skamp, K. & Preston, C. (2021). Chapter 11 – Physical and chemical change. In K. Skamp and C. Preston (Eds.), <i>Teaching primary science constructively / edited by Keith Skamp and Christine Preston</i>. (7th edition, pp. 468-516). Cengage.</p>	

Week 7 - Chemical sciences content (2/3) - 29 Aug 2022

Module/Topic	Chapter	Events and Submissions/Topic
Chemical sciences content (2/3)	<p>Skamp, K. & Preston, C. (2021). Chapter 10 – Materials and their properties. In K. Skamp and C. Preston (Eds.), <i>Teaching primary science constructively / edited by Keith Skamp and Christine Preston</i>. (7th edition). Cengage.</p>	

Week 8 - Chemical sciences content (3/3) - 05 Sep 2022

Module/Topic	Chapter	Events and Submissions/Topic
Chemical sciences content (3/3)		

Week 9 - Physical sciences content (1/3) - 12 Sep 2022

Module/Topic	Chapter	Events and Submissions/Topic
Physical sciences content (1/3)	<p>Skamp, K. & Preston, C. (2021). Chapter 7 – Movement and force. In K. Skamp and C. Preston (Eds.), <i>Teaching primary science constructively / edited by Keith Skamp and Christine Preston</i>. (7th edition). Cengage.</p>	

Week 10 - Physical sciences content (2/3) - 19 Sep 2022

Module/Topic	Chapter	Events and Submissions/Topic
Physical sciences content (2/3)	<p>Skamp, K. & Preston, C. (2021). Chapter 6 – Electricity. In K. Skamp and C. Preston (Eds.), <i>Teaching primary science constructively / edited by Keith Skamp and Christine Preston</i>. (7th edition). Cengage.</p> <p>For those students with the previous textbooks: Loxley (2018) Chapters 19 and 20.</p>	

Week 11 - Physical sciences content (3/3) - 26 Sep 2022

Module/Topic	Chapter	Events and Submissions/Topic
Physical sciences content (3/3)	Skamp, K. & Preston, C. (2021). Chapter 5 – Energy. In K. Skamp and C. Preston (Eds.), <i>Teaching primary science constructively / edited by Keith Skamp and Christine Preston.</i> (7th edition, pp. 468-516). Cengage.	

Week 12 - Unit review and consolidation - 03 Oct 2022

Module/Topic	Chapter	Events and Submissions/Topic
Unit review and consolidation		Assessment Task 2 Due Thursday 7th October 2021 11:45 PM AEST Evaluation of Two Primary Connections Units Due: Week 12 Thursday (6 Oct 2022) 11:45 pm AEST

Review/Exam Week - 10 Oct 2022

Module/Topic	Chapter	Events and Submissions/Topic
--------------	---------	------------------------------

Exam Week - 17 Oct 2022

Module/Topic	Chapter	Events and Submissions/Topic
--------------	---------	------------------------------

Assessment Tasks

1 Scientific Concepts and Alternate Conceptions

Assessment Type

Practical Assessment

Task Description

Task Context: People have many alternate conceptions about the scientific world. They think about what they do and see, building shared explanations of how objects and events work. The building of these ideas can often result in misconceptions.

Task Description: You are going to conduct a case study on a (pretend or real) student (Prep-Year 6) who has a (Chemical and Physical) scientific misconception and discuss how you will seek to modify this misconception as the child's teacher. Your response will be in two parts as elaborated on below.

Task Elaboration (It is recommended that you use these sub-headings (in bold) in your response).

Part A - Case Study: Select a scientific concept from either the Chemical or Physical sciences sub-strand of the Australian Curriculum (Science) that is commonly misunderstood or poorly understood. Misconceptions can often be found in the media, in popular culture or during conversations with children.

Learner context: Identify a learner context that you choose to work with from Foundation (Prep) to Year 6. You can use an actual child or create an interaction using a pseudonym.

Comparisons between alternate conception and current scientific conception: Compare student understandings with current scientific understandings. Include examples, data and a comparison of the language.

Part B - Replacing Alternate Conceptions: Develop a learning sequence that works to modify the alternate conception identified during Part A.

Discussion on research on teaching approach: The pedagogy used in your learning sequence must be linked to current research on effective teaching and learning practice and take account of the cognitive and language characteristics of the learner in the chosen age group.

Learning sequence - Should include the learning intention, success criteria, what the child will learn, materials needed (including ICT tool/s) and how it will be formatively assessed at the end of each lesson. You need to include a range of teaching strategies.

Presentation of work (Outcome) - How will the students present their understanding of their science

learning?

Note: It is recommended to include a brief introduction and conclusion in your submission.

Assessment Due Date

Week 5 Friday (12 Aug 2022) 11:45 pm AEST

Submit online via Moodle

Return Date to Students

Feedback on this assessment task will be provided following moderation.

Weighting

50%

Assessment Criteria

1. Scientific concept identified. Learner context identified.
2. Appropriate choice of and discussion about the diagnostic tool including examples of the language surfaced from using the tool.
3. Comparison of and explicit connections are drawn between the alternate conception with the currently recognised scientific conception and the demonstration of the knowledge and understanding of the science concept.
4. Range of teaching strategies included in the learning sequence based on high quality and contemporary research on effective learning and teaching practice in science education with the use of ICT.
5. Writing is consistent with academic conventions including the use of course readings and high-quality research and APA 7 Conventions.

Referencing Style

- [American Psychological Association 7th Edition \(APA 7th edition\)](#)

Submission

Online

Submission Instructions

Submit online via Moodle

Learning Outcomes Assessed

- Evaluate examples of teaching and assessment practice in Science to identify how connections are made to students' prior knowledge or experience to promote learning
- Access and apply professional literature on contemporary Science education to critically evaluate or justify planning and assessment practices
- Plan lesson sequences that use appropriate research-based teaching strategies and ICTs to structure content and address students' possible misconceptions in Science
- Develop diagnostic, formative and summative assessment tools that identify students' understanding of scientific phenomena

Graduate Attributes

- Problem Solving
- Critical Thinking
- Information Literacy
- Information Technology Competence
- Cross Cultural Competence

2 Evaluation of Two Primary Connections Units

Assessment Type

Practical and Written Assessment

Task Description

Task Description: You are to create or adapt two primary (or early childhood) teaching sequences (You are encouraged to adapt your units from Primary Connections units) to use in your future teaching of both physical and chemical sciences. You then need to outline how you are

planning to assess your students' learning. You need to use diagnostic, formative, and summative learning in these units and provide a research-supported discussion on why it is important to use all three forms of assessment in your future science teaching. There are two parts to this assignment as discussed below.

Part A: Assessment in Science

How can we effectively assess students' science understanding using diagnostic, formative, and summative assessments? Draw from the course readings and high-quality research to present a discussion on each of these three forms of assessment as they pertain to the teaching of Science.

Part B: Incorporating this assessment into your science teaching

- Choose two (*Primary Connections*) units, one from the Physical sciences sub-strand and one from the Chemical sciences sub-strand, taught in a primary school for any year level. (They can be from the same year level or different year levels).
- Provide a description of these teaching units along with how you will assess student understanding.
- Identify the types of assessment used in each unit and how they demonstrate student understanding.
- In light of current research around effective science assessment practice, identify the diagnostic, formative, and summative assessments used in these units of work.
- Make at least two recommendations for improvements in each of these *Primary Connections* units and include how you would incorporate assessment for each recommendation.
- These recommendations must be justified by links to current high-quality research about making reliable and consistent judgments on student learning.

While not explicitly stated, the use of an introduction and conclusion in your submission is a good idea.

Assessment Due Date

Week 12 Thursday (6 Oct 2022) 11:45 pm AEST

Submit online via Moodle

Return Date to Students

Feedback on this assessment task will be provided following moderation.

Weighting

50%

Assessment Criteria

1. A research-supported explanation of the use of diagnostic, formative, and summative assessments in the science classroom is given.
2. An explanation of how the types of assessment used in the units of work demonstrate student understanding and motivate or engage students in their own learning.
3. The two units draw on effective science teaching principles to engage students in learning about physical and chemical sciences.
4. Two appropriate recommendations are identified for improvement in the assessment items of each unit and justified by links to current research.
5. Cohesive writing is consistent with academic conventions. Extensive use of relevant and credible sources for an explanation of scientific concepts.

Referencing Style

- [American Psychological Association 7th Edition \(APA 7th edition\)](#)

Submission

Online

Submission Instructions

Submit online via Moodle

Learning Outcomes Assessed

- Evaluate examples of teaching and assessment practice in Science to identify how connections are made to students' prior knowledge or experience to promote learning
- Access and apply professional literature on contemporary Science education to critically evaluate or justify planning and assessment practices
- Develop diagnostic , formative and summative assessment tools that identify students' understanding of scientific phenomena
- Select assessment strategies that engage students in active learning, promote higher order thinking and scaffold students' understanding of core concepts in the areas of Chemical and Physical sciences.

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- 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