

UNIT INFORMATION

UNIT CODE	CR370								
UNIT NAME	Curriculum and Pedagogy: Science and Technologies								
ASSOCIATED HIGHER EDUCATION AWARDS	Bachelor of Education (Primary)								
DURATION	One Semester								
LEVEL	Level 7								
CORE / ELECTIVE	Core								
WEIGHTING	Unit credit points 10 (0.125 EFTSL) Course credit points: 320 - Bachelor of Education (Primary)								
LEARNING DELIVERY	<p>Internal/On Campus</p> <ul style="list-style-type: none"> • Weekly lecture • Weekly tutorial (where applicable) <p>Plus, Learning Portal</p> <p>External/Online</p> <ul style="list-style-type: none"> • Weekly virtual lecture/ tutorial <p>Plus, Learning Portal</p> <p>Learning Portal (Moodle™)</p> <ul style="list-style-type: none"> • Power Point presentation and resources • Weekly readings • Study guides • Collaborative forums: Student forums and News forum. • Turnitin assessment and feedback tool <p>All unit outlines are reviewed prior to the offering of the unit to take account of student and lecturer feedback.</p>								
STUDENT WORKLOAD	<table border="0"> <tr> <td>Contact hours/Directed Online study</td> <td>30 hours</td> </tr> <tr> <td>Reading, study and preparation</td> <td>50 hours</td> </tr> <tr> <td>Assignment preparation</td> <td>70 hours</td> </tr> <tr> <td>Total</td> <td>150 hours</td> </tr> </table> <p>Students requiring additional English language support are expected to undertake an additional one hour per week.</p>	Contact hours/Directed Online study	30 hours	Reading, study and preparation	50 hours	Assignment preparation	70 hours	Total	150 hours
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PREREQUISITES / COREQUISITES / RESTRICTIONS	<p>CR172 Introduction to Science and Technologies</p> <p>PE332 Teaching for Learning: Curriculum and Planning (P-6)</p>								

RATIONALE

Enduring Understanding:

Effective primary teachers are scientifically literate and confident in a range of pedagogies that motivate learners and promote scientific inquiry.

An understanding of pedagogy related to specific content knowledge in science and technologies provides for effective teaching in these areas. This unit is designed to assist pre-service teachers to develop their professional practice in the teaching of science and technologies. They will explore examples of 'best practice' pedagogy in these areas, based on the latest research into how students learn and engage with science and technologies. Pre-service teachers will be equipped to critically analyse a range of teaching approaches for effective, engaging lessons for students in the primary context.

CONTENT

1. The place of science and technology in schools and society, including:
 - 1.1. Integration of learning areas through STEM education
 - 1.2. Using science and technology in culturally diverse classrooms
 - 1.3. Engaging students from Aboriginal and Torres Strait Islander backgrounds in culturally appropriate ways in science and technology
2. Reviewing the literature: Best practice in science and technology education
3. Legislative requirements and safety in the science and technology classroom:
 - 3.1. Safe use of materials and equipment
 - 3.2. Safe and ethical use of technologies
4. Resources and strategies to creatively engage learners in science and technologies: classrooms including literacy, numeracy and ICT priorities:
 - 4.1. Examination of General Capabilities as they apply to Science and Technologies
 - 4.2. Trans-disciplinary opportunities in STEM
5. Approaches to teaching science and technology including Christian worldview perspectives:
 - 5.1. Utilisation of God's Big Story (GBS) to examine Christian perspectives
 - 5.2. 5E framework- Primary connections
 - 5.3. Inquiry-based pedagogies
 - 5.4. PBL pedagogies
 - 5.5. STEM as an integrating Science and Technology opportunity
6. Engaging diverse learners in science and technology using ICT pedagogies
7. Science and technology teaching: Putting knowledge and theory into practice using technology and innovation

LEARNING OUTCOMES

On completion of this unit, pre-service teachers will have provided evidence that they have:

1. engaged content and pedagogies mediated through ICT, relevant to the Australian Curriculum: Science and the Australian Curriculum: Technology documents
Graduate Teacher Standards: 2.1, 2.2, 2.6, 3.1, 3.2, 3.3, 3.4
Graduate Attributes: 1, 2, 4, 7
2. analysed current research regarding science education in primary classrooms
Graduate Teacher Standards: 2.1, 3.3

Graduate Attributes: 1, 2, 4, 7

- developed teaching and learning strategies and resources for teaching and assessing school student learning including literacy, numeracy and ICT pedagogies in science and technology

Graduate Teacher Standards: 2.1, 2.6, 3.3

Graduate Attributes: 1, 2, 4, 7

- critically analysed science curriculum documents and pedagogies from a Christian worldview perspective and

Graduate Teacher Standards: 2.1, 2.2, 3.1, 3.2, 3.3

Graduate Attributes: 3

- communicated at an appropriate tertiary standard, with special attention to design elements, grammar usage, logical relations, style, referencing and presentation

Graduate Attributes: 6

ASSESSMENT TASKS

In order to receive a passing grade a student must fulfil the following requirements:

- adequate submission/attempt of all assessment tasks
- achieve a summative exit grade of Pass or above

TASK 1: DIGITAL CONCEPT MAP

Investigate the links between the science and technology curriculum. Develop and present a digital concept map that considers the nature and scope of both the science and technology curriculum, identifying the core content, processes and values for teaching in these curriculum areas with an overlay of a Christian perspective using the God's Big Story GBS lens.

Word Length/Duration: 1,500 words

Weighting: 40%

Assessed: Week 5

TASK 2: UNIT PLAN AND PEER CRITIQUE

Develop a unit plan with resources that richly incorporate ICTs, drawing from the 5E Primary Connections framework (Science). The unit plan should intentionally integrate Science inquiry skills as well as Literacy, Numeracy and Digital literacies and a Christian perspective (GBS).

Complete a self and peer evaluation and reflection upon the unit plan for effectiveness, alignment to chosen P-2 or 3-6-year level and student engagement while in draft phase.

Word Length/Duration: 2,000 words

Weighting: 60%

Assessed: Week 10

ASSESSMENT ALIGNMENT

Assessment Task	Learning Outcome	Content	Graduate Teacher Standards	Graduate Attributes
Task 1	1-3, 5	1, 2, 5, 7	2.1, 3.4	1, 2, 4, 6, 7

Task 2	1-5	1, 3, 4, 5, 6, 7	2.1, 2.2, 2.5, 2.6, 3.1, 3.2, 3.3, 3.4, 4.4, 5.1	1, 2, 3, 4, 6, 7
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ASSESSMENT ELABORATION

Task 1: Digital Concept Map

Theoretical Underpinning:

There are a number of considerations that must be addressed in preparing this task. These include:

- Demonstration of expert understanding of the science and technology curriculum
- Evidence of synthesis of information from the curriculum and researched sources
- Expert use of ICTs to produce an electronic document or file set that is easy to read and navigate and makes good use of ICT capacities
- Familiarity with contemporary pedagogies for teaching science and technology.
- Demonstrated an understanding of a Christian perspective

It is expected that you will make good use of ICT skills developed in other units when putting this assessment piece together.

Presentation:

Using a single or combination of interconnected ICT tools, prepare an online or locally saved digital concept map. The concept map will show interconnections between science and technology discipline content, pedagogy and values in The Australian Curriculum: Science & The Australian Curriculum: Technology. The ICT tools must allow the reader to navigate around the concept map to explore the connections and pathways among the various components.

The concept format is open with the following as examples:

- Integrated PPT, Prezzi or similar (advanced level usage)
- Concept map design program (See Moodle list)
- Web pages

The concept map is to include an overview page(s) which electronically link to component sections. Component sections should include:

- annotated examples or illustrations in electronic form
- video or audio recordings
- online print or text resources
- interactive apps or website links
- GBS framework lens

These media are to be integrated within the concept map components.

An **offline concept map** will be submitted via a file electronically submitted to the lecturer.

A completely **online concept map** may be submitted by supplying the URL of the concept map, with any username, password, etc. needed to access it. An online concept map must be completed in full by the due date, with no editing to take place after the due date. A copy of the site will be taken on the due date and compared with the version at the time of marking.

Task 2: Unit Plan

Unit Plan:

The unit plan is to develop students' understanding of the core concept, in a sequenced, integrated manner.

Students may elect to prepare a thematic unit plan which connects learning activities from other curriculum areas with the core focus on science. Note that in this case, the non-science activities are to be listed and briefly described, but not developed in the same detail as the science activities.

The unit plan may be submitted as an electronic file through Turnitin as a OneDrive link.

Theoretical Underpinning:

There are a number of considerations that must be addressed in preparing this task. These include:

- Demonstration of expert knowledge of the *Australian Curriculum: Science & Technology syllabi*
- Familiarity with contemporary pedagogies for teaching science, with the goal of engaging students in learning that is relevant, fun, innovative and motivating
- Explicit mention of integration of literacy, numeracy and digital literacy skills
- Incorporation of ICTs in relevant, innovative ways

It is expected that you will apply the knowledge and skills of unit planning developed in other units and adapt these appropriately for a science discipline unit, when preparing this assessment piece.

Essential components

- Completed Unit Plan (template format)
- 8 -10 lesson sequence (recommended 5E model)
- At least 2 assessment activities, one moderate summative and one smaller diagnostic/formative, plus guides for making judgements
- One 'show case' practical lesson plan
- One GBS activity in each of the 5E phases
- Self and peer review sheet with feedback

SPECIALIST FACILITIES OR EQUIPMENT

Nil

PRESCRIBED TEXTS

Nil

Selected readings will be available via the Moodle™ site for this unit.

RECOMMENDED READINGS**CURRICULUM READINGS**

Australian Academy of Science. (2006). *Primary connections: Linking science with literacy*. Canberra, ACT: Department of Education, Employment & Workplace Relations.

Boss, S., & Krauss, J. (2018). *Reinventing project-based learning: Your field guide to real-world projects in the digital age* (3rd ed.). Eugene, OR: International Society for Technology in Education.

Giberson, K. (2012). *The wonder of the universe: Hints of God in our fine-tuned world*. Downers Grove, IL: IVP Books.

Harlen, W., & Qualter, A. (2014). *The teaching of science in primary schools*. (6th ed.). London, UK: Routledge.

Hewitt, P., Lyons, S., Suchocki, J., & Yeh, J. (2020). *Conceptual integrated science*. (3rd ed.). San Francisco, CA: Pearson.

Hudson, P. (Ed.). (2013). *Learning to teach in the primary classroom*. Melbourne, VIC: Cambridge University Press.

Martin, R., Sexton, C., & Franklin, T. (2014). *Teaching science for all children: An inquiry approach* (5th ed.). Harlow, UK: Pearson Education.

Moomaw, S. (2013). *Teaching STEM in the early years: Activities for integrating science, technology, engineering, and mathematics*. St. Paul, MN: Redleaf Press.

JOURNALS

The Australian Science Teachers' Journal
Journal of Technology Education

WEBSITES

Australian Academy of Science:
<https://www.science.org.au/>

Commonwealth Scientific and Industrial Research Organisation:
<http://www.csiro.au/Scootle>

Science:
<https://www.scootle.edu.au/ec/search?q=science&field=title&field=text.all&field=topic>

Australian Science Teachers Association:
www.asta.edu.au

Australasian Science Magazine:
www.australasianscience.com.au

ABC Science Online:
www.abc.net.au/science

Science Teachers Association of Queensland (STAQ):
<http://www.staq.qld.edu.au/>

OTHER

In addition to the resources above, students should have access to a Bible, preferably a modern translation such as The Holy Bible: The New International Version 2011 (NIV 2011) or The Holy Bible: New King James Version (NKJV).

These and other translations may be accessed free on-line at <http://www.biblegateway.com>. The Bible app from LifeChurch.tv is also available free for smart phones and tablet devices.

UNIT REVIEW

SEMESTER	FEEDBACK AND RESPONSE

RUBRIC

TASK 1: DIGITAL CONCEPT MAP

LO	CRITERIA	HIGH DISTINCTION	DISTINCTION	CREDIT	PASS	FAIL
1, 2	Coverage and description of Science and Technology curriculum areas	Demonstrates a superior knowledge and understanding of key ideas and concepts of curricula areas Insightful curricular interconnections	Demonstrates a high level of knowledge and understanding of key ideas and concepts of curricula areas Meaningful curricular interconnections	Demonstrates a sound knowledge and understanding of key ideas and concepts of curricula areas Multiple curricular interconnections	Demonstrates a sound knowledge and understanding of key ideas and concepts of curricula areas. Some curricular interconnections	Awareness of ideas about curriculum concepts but with inadequate development
1, 3	Concept elaborations with supporting resources and illustrations (Quality, variety and relevance)	Extensive range and variety of supporting resources. Of high quality and value Well differentiated by learning phase (P-2, 4-6)	Wide range and variety of supporting resources. Of high quality and value. Moderate differentiated by learning phase (P-2, 4-6)	A range and variety of supporting resources. Of quality and value Some differentiated by learning phase (P-2, 4-6)	An adequate range and variety of supporting resources. Of sound quality and value Minor differentiated by learning phase (P-2, 4-6)	Inadequate or limited range and variety of supporting resources
4	Christian integration and perspectives: (GBS)	Comprehensive elaboration of GBS lens with specific and meaningful information displaying very high-level knowledge/integration of Christian perspectives	High quality elaboration of GBS lens with specific and meaningful information displaying a strong knowledge/integration of Christian perspectives	Meaningful elaboration of GBS lens displaying core knowledge/integration of Christian perspectives	Sound elaboration of GBS lens displaying adequate knowledge/integration of Christian perspectives	Inadequate/limited elaboration of pedagogy and/or Christian perspectives
5	Concept mapping Visual representation, logical, effective communication and interface	Superior design and layout Logical and clear navigation Highly effective user-friendly interface	Quality design and layout Logical and clear navigation Effective user-friendly interface	Sound design and layout Logical and clear navigation User-friendly interface with only minor 'bugs'	Sound design and layout Generally logical and clear navigation User-friendly interface with multiple minor 'bugs'	Design and layout and/or interface of limited standard

COMMENT



RUBRIC

TASK 2: UNIT PLAN AND PEER CRITIQUE

LO	CRITERIA	HIGH DISTINCTION	DISTINCTION	CREDIT	PASS	FAIL
1, 2, 3, 5	Unit Plan <ul style="list-style-type: none"> Curricular linkage, description and objectives Developmental progression (5E) Assessment design and marking guide 	Well described, accurate and integrated unit rational, content description and learning objectives	Clearly described, accurate and integrated unit rational, content description and learning objectives	Accurate and integrated unit rational, content description and learning objectives	Accurate and integrated unit rational, content description and learning objectives with some weaknesses	Inadequate or limited unit plan rationale, objective and description
		Superior developmental sequence incorporating 5E Learning phases in an insightful manner to create a highly meaningful progression	Very effective developmental sequence incorporating 5E Learning phases in a manner to create a highly meaningful progression	Effective developmental sequence incorporating 5E Learning phases in a manner to create a meaningful progression	A developmental sequence incorporating 5E Learning phases is evident, which creates a sound level of understanding	Inadequate or limited unit plan development
		Authentically integrated assessment, which is highly aligned to unit objectives. Clear and logical marking guides	Authentically integrated assessment, which is aligned to unit objectives. Clear and logical marking guides	Integrated assessment, which is aligned to unit objectives. Clear and logical marking guides	Assessment is connected to unit objectives. Sound marking guides	Inadequate or limited assessment
3, 4	Cross-curricular/General Capabilities and Christian perspective integration	Comprehensive integration of all relevant CCP, GP and Christian perspectives	Effective integration of all relevant CCP, GP and Christian perspectives	Effective integration of most relevant CCP, GP and Christian perspectives with some weakness	Integration of most relevant CCP, GP and Christian perspectives but being general at times	Inadequate Integration of CCP, GP and Christian perspectives
1, 2, 3	Practical lesson <ul style="list-style-type: none"> Creativity, innovation and learner engagement Internal and unit alignment. 	Lesson displays creativity, innovation and capacity to engage the learner at a superior level Lesson sequence and development seamlessly aligns with the lesson objectives and unit objectives	Lesson displays creativity, innovation and capacity to engage the learner Lesson sequence and development aligns with the lesson objectives and unit objectives	Lesson displays elements of creativity, innovation and capacity to engage the learner Lesson sequence and development generally aligns with the lesson objectives and unit objectives	Lesson displays some creativity, innovation and capacity to engage the learner but only to a sound level Lesson sequence and development generally aligns with the lesson objectives and unit objectives	Lesson displays creativity, innovation and capacity to engage the learner at a superior level Lesson sequence and development aligns with the lesson objectives and unit objectives



LO	CRITERIA	HIGH DISTINCTION	DISTINCTION	CREDIT	PASS	FAIL
	Critical reflection and peer review	Extensive and insight self-reflection Well-constructed feedback sheet Highly articulate response to peer feedback	Extensive self-reflection. Well-constructed feedback sheet Articulate response to peer feedback	Considered self-reflection Clear feedback sheet Sound response to peer feedback	Satisfactory self-reflection. Clear feedback sheet Response to peer feedback evident	Limited self/peer feedback demonstrated

COMMENT

