CHRISTIAN HERITAGE COLLEGE

CR262

CURRICULUM AND PEDAGOGY: MATHEMATICS AND NUMERACY

This sample unit outline is provided by CHC for prospective and current students to assist with unit selection.

Elements of this outline which may change with subsequent offerings of the unit include Content, Required Texts, Recommended Readings and details of the Assessment Tasks.

Students who are currently enrolled in this unit should obtain the outline for the relevant semester from the unit lecturer.

Unit code	CR262
Unit name	Curriculum and Pedagogy: Mathematics and Numeracy
Associated higher education awards	Bachelor of Education (Primary)
Duration	One semester
Level	Intermediate
Core/elective	Core
Weighting	Unit credit points: 10 Course credit points: Bachelor of Education (Primary) 320
Delivery mode	Face-to-face on site
Student workload	*Face-to-face on site* Contact hours 30 hours Reading, study and assignment preparation 120 hours **TOTAL** **150 hours**
	Students requiring additional English language support are expected to undertake an additional one hour per week.
Prerequisites/ co-requisites/ restrictions	*Prerequisite:* CR161 Introduction to Mathematics and Numeracy
Rationale	Enduring Understanding: Mathematics helps us solve complex problems and is taught through engaging pedagogy. This unit, the second core unit for pre-service teachers of Prep-Year 6 mathematics, introduces pre-service teachers to the methods and attitudes of effective mathematics education, following their study of the discipline content of the mathematics curriculum in the previous unit, CR161 Introduction to Mathematics and Numeracy. Pre-service teachers will be introduced to the curriculum and pedagogy of mathematics, including key terminology, sequencing of content within topics and common misconceptions and limited understanding in school students, revealed in the mathematics education literature. Issues including the distinctions and links between mathematical knowledge and numeracy, the place of materials and ICT, the use of games, and the affective dimensions of mathematics teaching and learning will be investigated. Critical issues of teaching for the development of a broad and useful numeracy will be addressed, and linked to recommendations in current Australian Curriculum documents. An emphasis is given to development of personal numeracy and number sense on the part of pre-service teachers, rather than merely training to follow procedures without such understanding.
Prescribed text(s)	Booker, G., Bond, D., Briggs, J., Sparrow, L., & Swan, P. (2014). *Teaching primary mathematics* (5th ed.). Frenchs Forest, NSW: Pearson Education Australia. Selected readings will be available via the Moodle™ site for this unit.

Recommended readings	**Books** Bender, W.N. (2013). *Differentiating math instruction, K-8: Common core mathematics in the 21st century classroom* (3rd ed.). Thousand Oaks, CA: Corwin. Clausen-May, T. (2013). *Teaching mathematics visually & actively* (2nd ed.). London, UK: SAGE Publications. Reys, R.E., Lindquist, M.M., Lambdin, D.V., Smith, N.L., Rogers, A., Falle, J., Frid, S., & Bennett, S. (2012). *Helping children learn mathematics* (1st Australian ed.). Brisbane, QLD: John Wiley & Sons. Simeon, D., Beswick, K., Brady, K., Faragher, R., & Warren, E. (2015). *Teaching mathematics: Foundations to middle years* (2nd ed.). South Melbourne, VIC: Oxford University Press. Vasquez, J.A., Sneider, C., & Comer, M. (2013). *STEM lesson essentials, grades 3-8: Integrating science, technology, engineering, and mathematics.* Portsmouth, NH: Heinemann. Van de Walle, J.A., Karp, K.A., & Bay-Williams, J.M. (2013). *Elementary and middle school mathematics: Teaching developmentally* (8th ed.). Boston, MA : Pearson. **Journals** *The Arithmetic Teacher* *Mathematics Education Research Journal* *Mathematics Teacher* *Teaching Children Mathematics* **Websites** Australian Curriculum, Assessment and Reporting Authority (ACARA) http://www.australiancurriculum.edu.au/mathematics/curriculum/ Australian Curriculum Lessons http://www.australiancurriculumlessons.com.au/category/mathematics-lessons/ Queensland Association of Mathematics Teachers http://www.qamt.org/ Scootle http://www.scootle.edu.au/ Australian Association of Mathematics Teachers http://aamt.edu.au/ Queensland Curriculum and Assessment Authority (QCAA) https://www.qcaa.qld.edu.au/ 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) 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.
Specialist resource requirements	Scientific calculator or suitable device

Content	1. Contemporary issues in mathematics education, including a. using mathematics in culturally diverse classrooms b. engaging students from Aboriginal and Torres Strait Islander backgrounds in culturally appropriate ways in mathematics c. using mathematical understandings for promoting reconciliation with Aboriginal and Torres Strait Islander peoples 2. Understanding the development of mathematical thinking from a Christian worldview perspective 3. Assessment strategies, including informal, formal, diagnostic, formative and summative 4. The place of materials in representing mathematical concepts and skills 5. Gaming theory to enhance the understanding of mathematical principles 6. The effect of the affective domain on the teaching and learning of mathematics 7. Teaching for understanding rather than knowledge of standard routines 8. Pedagogical frameworks for teaching computation, geometry and measurement 9. Application of mathematics and numeracy across the curriculum from a Christian worldview 10. Use of ICTs to develop numeracy and learn mathematics 11. Problem solving as a focus of mathematics education 12. Applications of probability and data collection
Learning outcomes	On completion of this unit, pre-service teachers will have provided evidence that they have: 1. demonstrated the use of pedagogies for teaching across the key elements of mathematics: meeting current national and state-based curriculum imperatives; 2. developed knowledge and understanding of evidence-based pedagogies in real-world contexts for the teaching of mathematics and numeracy; 3. developed teaching and learning goals, strategies and resources including ICT to engage, support and assess learning and development in mathematics and numeracy; 4. articulated Christian worldview perspectives relating to mathematics pedagogy and inclusive teaching practices; 5. critically reflected upon the praxis of mathematics pedagogies and assessment in the light of contemporary theory, research and achievement data; and 6. communicated at an appropriate tertiary standard: with special attention to design elements, grammars, usage, logical relations, style, referencing and presentation.
Assessment tasks	**Task 1: Planning** Creation of a mathematics assessment task and guide to making judgements. Design a learning and assessment activity to be used with school students that involves realistic use of mathematics to solve or address a real-world problem or inquiry, and involves appropriate use of ICTs. Word Length/Duration: 1,000 words Weighting: 40% Learning Outcomes: 1-3, 6 Assessed: Week 5 **Task 2: Learning Sequence** Develop a learning sequence based on Assessment Task 1 with resources that engage students in mathematical thinking. Presentation, in class and online, of an innovative learning sequence, involving at least five developmental activities, designed to engage school students in mathematical thinking for one curriculum organiser, in which at least one activity involves substantial use of ICTs. Word Length/Duration: 2,000 words Weighting: 60% Learning Outcomes: 1-6 Assessed: Week 14

<table>
<tr><td>Australian Professional Standards for Teachers (APST)</td><td>The learning opportunities provided in this unit contribute to the development of practice, knowledge and values of the following Australian Professional Standards for Teachers:
1.2 Understand how students learn
1.3 Students with diverse linguistic, cultural, religious and socioeconomic backgrounds
1.4 Strategies for teaching Aboriginal and Torres Strait Islander students
2.3 Curriculum, assessment and reporting
2.4 Understand and respect Aboriginal and Torres Strait islander people to promote reconciliation between Indigenous and non-Indigenous Australians
2.5 Literacy and numeracy strategies
2.6 Information and Communication Technology
3.5 Use effective classroom communication
3.6 Evaluate and improve teaching programs
4.2 Manage classroom activities
4.5 Use ICT safely, responsibly and ethically
5.4 Interpret student data</td></tr>
<tr><td></td><td>Successful completion of this unit will provide significant evidence about the following Australian Professional Standards for Teachers:
<table>
<tr><th colspan="2">Graduate Teacher Standards</th><th>Learning Outcomes</th><th>Assessment Tasks</th></tr>
<tr><td>2.1</td><td>Demonstrate knowledge and understanding of the concepts, substance and structure of the content and teaching strategies of the teaching area.</td><td>1-3</td><td>1, 2</td></tr>
<tr><td>2.2</td><td>Organise content into an effective learning and teaching sequence.</td><td>1-3</td><td>2</td></tr>
<tr><td>3.1</td><td>Set learning goals that provide achievable challenges for students of varying abilities and characteristics.</td><td>3</td><td>2</td></tr>
<tr><td>3.2</td><td>Plan lesson sequences using knowledge of student learning, content and effective teaching strategies.</td><td>1-3</td><td>2</td></tr>
<tr><td>3.3</td><td>Include a range of teaching strategies.</td><td>2, 3</td><td>2</td></tr>
<tr><td>3.4</td><td>Demonstrate knowledge of a range of resources, including ICT, that engage student in their learning.</td><td>3</td><td>2</td></tr>
<tr><td>5.1</td><td>Demonstrate understanding of assessment strategies, including informal and formal, diagnostic, formative and summative</td><td>3, 5</td><td>1, 2</td></tr>
</table></td></tr>
<tr><td>Unit summary</td><td>Pre-service teachers will be introduced to the curriculum and pedagogy of mathematics, including key terminology, sequencing of content within topics and issues of common misconceptions and limited understanding in school students, revealed in the mathematics education literature. Issues including the distinctions and links between mathematical knowledge and numeracy, the place of materials and ICT, and the affective dimensions of mathematics teaching and learning will be investigated.</td></tr>
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