

EDUC6749: Advanced Numeracy Studies

Callaghan

Trimester 1 - 2024



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

OVERVIEW

Course Description	This course deepens students' understanding of the impact of the principles and practices of teaching and learning mathematics in primary schools. Students will explore the numeracy demands of all key learning areas in the primary curriculum. Students will learn how to interpret school-based and system-wide numeracy data in order to make informed decisions about student numeracy needs. With a focus on helping students to reason or "work mathematically", this course will place particular attention upon instructional strategies and educational technologies for teaching and assessing the foundational mathematical concepts of number and algebra, measurement and geometry, and statistics and probability.
Academic Progress Requirements	Nil
Requisites	This course is only available to students enrolled in the Master of Teaching (Primary) [11714] and the Master of Teaching (Primary) [40205] programs.
Assumed Knowledge	Students must complete EDUC6739 prior to enrolling.
Contact Hours	Callaghan Lecture Online 1 hour(s) per week(s) for 12 week(s) Tutorial Face to Face On Campus 2 hour(s) per week(s) for 12 week(s) 80% attendance requirements due to NESA accreditation and to ensure all course outcomes are met.
Unit Weighting	10
Workload	Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10-unit course.

COURSE OUTLINE

CONTACTS

Course Coordinator **Callaghan**
Dr Zara Ersozlu
Zara.Ersozlu@newcastle.edu.au
+61 2 4055 0753
Consultation:

Teaching Staff Other teaching staff will be advised on the course Canvas site.

School Office **School of Education**
V Building
Callaghan
Education@newcastle.edu.au
+61 2 4921 6428

SYLLABUS

Course Content

- The numeracy demands of all key learning areas in the primary curriculum.
- Numeracy in everyday life.
- School-based and system-wide numeracy data.
- Working mathematically.
- Instructional strategies and educational technologies for teaching and assessing the foundational mathematical concepts of number and algebra, measurement and geometry, statistics and probability.

Course Learning Outcomes

On successful completion of this course, students will be able to:

1. Identify the numeracy demands of all key learning areas in the primary curriculum.
2. Identify the numeracy demands of everyday life.
3. Interpret school-based and system-wide numeracy data in order to make informed decisions about student numeracy needs.
4. Design instruction that assists students to work mathematically.
5. Select appropriate instructional strategies and educational technologies for teaching and assessing the foundational mathematical concepts of quantity, measurement, spatial representation, and generalisation.

Course Materials **Lecture Materials:**
Lecture materials/power points will be made available via Canvas.

Recommended Reading:
Sellars, M. (2018). *Numeracy In Authentic Contexts: Making Meaning Across the Curriculum*, Springer, Singapore. (online text available in the library)

Sullivan, P. (2011). *Teaching mathematics: Using research-informed strategies*. Retrieved from <https://research.acer.edu.au>

Required Reading:
NSW Board of Studies. (2022). *Mathematics K-10 Syllabus*. Sydney: NSW BOSTES

NSW Department of Education and Training. (2006). *Quality Teaching classroom practice guide*. Ryde: NSW DET

NSW Education Standards Authority. (2021). *Mathematics K-2 Syllabus*. NESA NSW.

Ewing, B., Cooper, T. J., Baturo, A. R., Matthews, C., & Sun, H. (2010). Contextualising the Teaching and Learning of Measurement within Torres Strait Islander Schools. *The Australian Journal of Indigenous Education*, 39(1), 11-23.

Geiger, V., Forgasz, H., & Goos, M. (2015). A critical orientation to numeracy across the curriculum. *ZDM*, 47(4), 611-624. doi:10.1007/s11858-014-0648-1

Gutiérrez, R. (2017). Why Mathematics (Education) was Late to the Backlash Party: The Need for a Revolution. *Journal of Urban Mathematics Education*, 10(2), 8-24.

Kilpatrick, J., Swafford, J., & Findell, B. (2001). *Adding it up: helping children learn mathematics*. Washington, DC: National Academy Press. Retrieved from <https://go.exlibris.link/GdcwVm5B>

Koehler, M. J., Mishra, P., & Cain, W. (2013). What is Technological Pedagogical Content Knowledge (TPACK)? *Journal of Education*, 193(3), 13-19. doi:10.1177/002205741319300303

Siemon, D., Warren, E., Beswick, K., Faragher, R., Miller, J., Horne, M, Jazby, D. & Breed, M (2020). *Teaching Mathematics: Foundations to middle years* (3 ed.). South Melbourne, Victoria: Oxford University Press.

Skovsmose, O. (1994). Towards a Critical Mathematics Education. *Educational Studies in Mathematics*, 27(1), 35-57. doi:10.1007/BF01284527

Stern, E., & Bachman, R. (2021). Pattern Play: The Case for Dance in College Mathematics and Beyond. *Journal of Dance Education*, 21(3), 158-167. doi:10.1080/15290824.2021.1939357

ASSESSMENTS

This course has 2 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Case Studies/Data Analysis	March 10th 11:59pm	Individual	50%	1, 3, 4, 5
2	Capstone Research Report	Sunday 21st April 11:59pm	Individual	50%	2, 4, 5

Late Submissions

The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

Assessment 1 - Case Studies/Data Analysis

Assessment Type Description

Case Study / Problem Based Learning

Through careful analysis of a student work sample, students apply knowledge and skills in teaching numeracy across the Primary curriculum, with demonstration of understanding of school and system requirements as well as research-backed pedagogical approaches.

Part a - Analysis and report

Students will examine an example of school-based data collection (specifically BEST START) and deeply analyse a sample BEST START student assessment. They will then validate a proposed program for a Kindergarten class based on the results of the above student.

Part b - Integrated Numeracy program

Students will choose a Core KLA and indicate three areas where numeracy can be integrated. They will choose one area and design a fully resourced lesson that demonstrates numeracy across the curriculum that includes differentiation of tasks that is to be developed to cater for a group of similarly placed students. Knowledge of Instructional strategies and educational technologies to enhance student learning will also be required.

Weighting	50%
Due Date	March 10th 11:59
Submission Method	Online Canvas
Assessment Criteria	Students are assessed on their ability to analyse examples of school-based data collection and then develop an appropriate integrated numeracy program <ol style="list-style-type: none">1. Accurate analysis of school-based data collection and ability to understand how this informs future planning2. Demonstration of ability to plan) a fully resourced lesson that demonstrates numeracy across the curriculum with appropriate instructional strategies and educational technologies. Proforma given on canvas is to be used.
Return Method	Online
Feedback Provided	Online - Canvas within three weeks of submission

Assessment 2 - Capstone Research Report

Assessment Type Report

Description This task helps to frame students' understanding of a field of research in mathematics education, and the implications this has for teaching and assessing the foundational mathematics concepts.

Part a –Literature review

The literature review requires identification of a mathematical concept or field of research related to mathematics education, and a critical exploration of its parameters. This could be focused on a concept identified in assignment one and/or a topic identified in the literature. The topic should be selected on the grounds of students' professional interests, but also consider those that are perceived as difficult to teach to primary school students, and or are significant to understandings of Mathematics education today.

A 1500-word literature review is required that demonstrates engaging critically with educational research. A statement of purpose, outlining the relevance or significance of the topic as well as key definitions pertinent to it, must frame the inquiry. Different perspectives on the topic, and a sense of the discourse around the research related to it, must be conveyed. Students must ensure they have engaged widely and deeply with the field, and have presented a synthesis of findings in some cohesive structure. A final discussion and recommendations section should reflect students' understanding of the material reviewed.

Part b – Literature Journal

This section precludes Part a and requires students to submit a weekly Literature Journal entry for each of the required readings outlined on the course 'Weekly schedule' for weeks 1, 2, 3, 4, 5, 6, 8, 9, 10, 11 on canvas. Submissions are weekly and are submitted through the Assignments portal on Canvas and must be completed on the appropriate Literature Journal proforma. Marks are awarded for quality of the Journal submissions, as well as timeliness and completion of all components.

Weighting	50%
Due Date	Sunday 21st April 11:59
Submission Method	Online Canvas
Assessment Criteria	Students are assessed on their ability to clearly identify and critically explore a mathematical concept or field of research related to mathematics education through a literature review, weekly literature journal entries and links to lesson planning <ol style="list-style-type: none">1. Demonstration of the ability to clearly articulate and critically explore a maths concept, field of research and produce a succinct and clear literature review stating the relevance of the topic, its significance and outlining a number of different perspectives showing a wide engagement with the field.2. Discussion and findings in the literature review are clear and pertinent3. Academic standards of writing and APA 7th referencing are of a high standard4. Ability to produce a timely and complete Literature review entry weekly using appropriate proforma
Return Method	Online
Feedback Provided	Online - Canvas within three weeks of submission

ADDITIONAL INFORMATION

Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction (D)	Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

Attendance

*Skills are those identified for the purposes of assessment task(s).

Attendance/participation will be recorded in the following components:

- Tutorial (Method of recording: Students need to attend to weekly tasks, and participate in tutorials, to meet the course objectives. As such, a 80% attendance record is expected from all students)

Communication Methods

Communication methods used in this course include:

- Canvas Course Site: Students will receive communications via the posting of content or announcements on the Canvas course site.
- Email: Students will receive communications via their student email account.

Course Evaluation

Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.

Oral Interviews (Vivas)

As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the [Oral Examination \(viva\) Procedure](#). In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the [Student Conduct Rule](#).

Academic Misconduct

All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in all locations. For the Student Academic Integrity Policy, refer to <https://policies.newcastle.edu.au/document/view-current.php?id=35>.

Adverse Circumstances

The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s). Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where:

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1. the assessment item is a major assessment item; or
 2. the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system;
 3. you are requesting a change of placement; or
 4. the course has a compulsory attendance requirement.

Before applying you must refer to the Adverse Circumstance Affecting Assessment Items Procedure available at:

<https://policies.newcastle.edu.au/document/view-current.php?id=236>

Important Policy Information

The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the policies and procedures at <https://www.newcastle.edu.au/current-students/respect-at-uni/policies-and-procedures> that support a safe and respectful environment at the University.

This course outline was approved by the Head of School. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.

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EDUC6749 – Advanced Numeracy Studies (2023)				Assess Due	Readings
Week	Week Begins	Topic: Lecture	Topic: Tutorial		
1	29/1	Introduction to EDUC6749 Connectionist Approach	Effective Principles for Maths Instruction MTT Mathematics Anxiety.pdf (education.vic.gov.au)		Teaching mathematics: Using research-informed strategies Overview of research - Research article – Sullivan, P. (2011) Teaching Mathematics: Using research-informed strategies (acer.edu.au) Chapter 5, page 24 to 30
2	05/02	Mathematics K-10 Syllabus (2022)	Big Ideas in Maths K-2 Micro learning		Boaler J and Williams C (2017) What is mathematical beauty? Teaching through big ideas and connections [PDF 2.4 MB] . <i>youcubed</i> , Stanford.
3	12/02	System-wide numeracy data (Common Grade Scale, Progressions, Best Start, NAPLAN)	Creating mathematical inquiries. Instructional Strategies for Additive thinking and Multiplicative thinking		An instructional model to support planning and teaching student centred structured inquiry lessons Sullivanetal.APMC2021.pdf (Sullivan, Bobis, Downton, Feng, Hughes, Livy, McCormack & Russo
4	19/02	Designing and teaching a mathematics unit	Assess 1: In groups analyse the Best Start Kindergarten Assessment sample and identify what the student can do and where they need to go next Assess 1: In groups complete an overview of your chosen Core KLA.		Russo J (2020) ' Designing and scaffolding rich mathematical learning experiences with challenging tasks ', <i>Australian Primary Mathematics Classroom</i> 25(1), accessed 28 July 2022 Sullivan P, Askew M, Cheeseman J, Clarke D, Morname A, Roche A, Walker N (2015) ' Supporting teachers in structuring mathematics lessons involving challenging tasks ', <i>Journal of Mathematics Teacher Education</i> 18(2):123-140, accessed 28 July 2022
5	26/02	Numeracy in everyday life Seimon et al. (2021) Ch9	Numeracy across the curriculum		Critical Connections Between Numeracy and Mathematics MTT Critical Connections Between Numeracy and Mathematics.pdf (education.vic.gov.au) Dave Tout Senior Research Fellow, Numeracy and Mathematics, Tertiary and Vocational Assessment Services, Australian Council for Educational Research (ACER)
6	04/03	Effective Assessment strategies - for, as and of Learning	Formative, Diagnostic, Summative assessment opportunities in Mathematics	Assess 1	Gathering Evidence of Student Achievement - Google Slides No Journal entry for this week

		Learning Progressions	Seimon et al. (2021) Ch6	Sun 10/03 11:59pm	56 different ways to gather evidence of student achievement
Assessment 1A: Case Study /Data analysis Assessment 1B Y3-6. Numeracy across the curriculum					
7	11/03	Research/Theories that support learning and numeracy development in education	The role of rich mathematical tasks		Way J and Bobis J (2017) The literacy of mathematics <i>PETAA Paper</i> , 208. Primary English Teaching Association Australia (PETAA), Sydney
8	18/03	Problem Solving Seimon et al. (2021) Ch5 Mathematical concepts and fields of research	Assessment 2 expectations. Literature searches and review incl. critical analysis Instructional Strategies for teaching Fractions Seimon et al. (2021) Ch6		Developing an Understanding of the Size of Fractions tdt_F_gould1(2).pdf Peter Gould (AAMT) Fluency, reasoning and problem solving in primary maths Fluency, reasoning and problem solving in primary maths Tes
9	25/03	Working Mathematically and Reasoning - Supporting students to develop reasoning	Instructional Strategies for teaching geometry. Seimon et al. (2021) Ch19, 21		Mathematical reasoning (nsw.gov.au) Dr Kristen Tripet using-the-proficiencies-to-enrich-mathematics-teaching-and-assessment.pdf (australiancurriculum.edu.au) – Peter Sullivan
10	01*/04	Including all students in mathematics learning experiences Seimon et al. (2021) Ch8	Mathematics & Culture – Indigenous Mathematics Instructional Strategies for teaching Measurement Seimon et al. (2021) Ch19, 20		MTT_teaching_maths_cultural_perspective.pdf (education.vic.gov.au) - Chris Matthews- PhD in applied mathematics and is currently a senior curriculum officer for ACARA, Associate Dean (Indigenous Leadership) Science Faculty, University Technology of Sydney and the Chair of the Aboriginal and Torres Strait Islander Mathematics Alliance (ATSIMA).
11	08/04	STEM	Quality Teaching and mathematics file:///C:/Users/User/Downloads/20230103T115054_educ6749_quality_teaching_classroom_practice_guide.pdf		MTT_stem_agenda.pdf (education.vic.gov.au) Dianne Siemon Emeritus Professor, RMIT University State of Victoria (Department of Education and Training) 2021
12	15/04	Consultation	Revision based on student feedback		
Assessment 2 – Capstone Research Report and Literature journal				Assess 2 Sun 21th April 11:59	

- Easter Monday and Tuesday- Lecture will be prerecorded and available on Monday and the Tuts will be synchronous online on Tuesday evening (the time TBD).