

## EDUC3090: Specialist Studies in Mathematics 2

Callaghan

Semester 1 - 2024



THE UNIVERSITY OF  
NEWCASTLE  
AUSTRALIA

# OVERVIEW

**Course Description** This course deepens students' understanding of the principles and practices of teaching and learning Mathematics in schools. Students will explore course, programming and assessment requirements of the National Assessment Program - Literacy and Numeracy (NAPLAN) and the Higher School Certificate for Mathematics. Specific attention will be given to the literacy and numeracy demands of Mathematics as an area of study.

**Requisites** Enrolment in this course is dependent on meeting the teacher education admission milestone of successful completion of

- Three HSC band 5s (including one in English) or
- 80 units of UoN courses or
- Regulatory authority approved comparable pathways or
- Commencement in the program pre 2016

**Assumed Knowledge** EDUC1101

**Contact Hours** Callaghan

**Integrated Learning Session**

Online

6 hour(s) per Term Full Term

Integrated Learning will typically consist of a series of online activities.

**Lecture**

Face to Face On Campus

1 hour(s) per Week for 8 Weeks

**Tutorial**

Face to Face On Campus

2 hour(s) per Week for 8 Weeks

**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

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# CONTACTS

<b>Course Coordinator</b>	<b>Callaghan</b> Ms Beth Preston <a href="mailto:Beth.Preston@newcastle.edu.au">Beth.Preston@newcastle.edu.au</a> (02) 4921 6614 Consultation: meetings can be arranged before and after tutorials
<b>Teaching Staff</b>	Other teaching staff will be advised on the course canvas site.
<b>School Office</b>	<b>School of Education</b> V Building Callaghan <a href="mailto:Education@newcastle.edu.au">Education@newcastle.edu.au</a> +61 2 4921 6428

# SYLLABUS

<b>Course Content</b>	<ul style="list-style-type: none"><li>• Course, programming and assessment requirements of the NSW School Certificate and Higher School Certificate for Mathematics.</li><li>• Support the literacy and numeracy demands of mathematics as an area of study.</li><li>• Methods for addressing common misconceptions of mathematical concepts.</li></ul>
<b>Course Learning Outcomes</b>	<p><b>On successful completion of this course, students will be able to:</b></p> <ol style="list-style-type: none"><li>1. Interpret the course, programming and assessment requirements of the different standard tests applicable in NSW (Higher School Certificate and NAPLAN for Mathematics);</li><li>2. Support the literacy and numeracy demands of mathematics as an area of study.</li><li>3. Address common misconceptions students hold with regard to mathematical concepts.</li></ol>
<b>Course Materials</b>	<p><b>Recommended Reading:</b></p> <p>Hine, G., Anderson, J., Reaburn, R., Cavanagh, M., Galligan, L., Ngu, B. H., &amp; White, B. (2021). <i>Teaching secondary mathematics</i>. Cambridge University Press.</p> <p>(Killen, R. (2005). <i>Programming and assessment for Quality Teaching and learning</i>. Thomson Science Press. Note these books are available in the library</p> <p><b>Other Resources:</b></p> <ul style="list-style-type: none"><li>- Lecture, Tutorial materials and required readings will be made available on canvas</li></ul>

# SCHEDULE

Week	Week Begins	Topic	Learning Activity	Assessment Due
1	20 Feb	Introduction to EDUC3090	7-12 Mathematics sequencing and assessment requirements	
2	27 Feb	The language features of mathematics 1	Principles of Assessment: - Reliability - Validity Types of Assessment: - Diagnostic, formative, summative. - Norm referenced, criterion referenced, standards-based.	
3	6 Mar	The language features of mathematics 2	Alternative types of assessment in mathematics	
4	13 Mar	Historical development of mathematical language	Quality Teaching and assessment	
5	20 Mar	Teaching Mathematics to English Language Learners	Unit planning and assessment	
6	27 Mar	Teaching strategies for overcoming language difficulties 1	Using taxonomies to guide assessment	Assessment task 1 presentations and Task Due
7	3 Apr	Teaching strategies for overcoming language difficulties 2	Higher order thinking and Assessment	
<b>Mid Term Break</b>				
<b>Mid Term Break</b>				
8	24 Apr	Teaching strategies for overcoming language difficulties 3		
9	1 May			
10	8 May			
11	15 May			
12	22 May			Assessment task 2
13	29 May			
<b>Examination Period</b>				
<b>Examination Period</b>				

# ASSESSMENTS

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

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Assignment 1	Friday, Week 6, 11.59pm	Individual	50%	1, 3
2	Assignment 2	Friday, Week 12, 11.59pm	Individual	50%	1, 2

## 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.

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## Assessment 1 - Assignment 1

<b>Assessment Type</b>	Written Assignment
<b>Purpose</b>	The purpose of this assignment is to allow students to demonstrate communication skills, deep knowledge and understanding of programming and assessment practice for the Mathematics Syllabus.
<b>Description</b>	<p>Students will be allocated one topic from the NSW Stage 6 Mathematics advanced or standard syllabus.</p> <p>Students will develop a teaching program for the topic and a formal exam on the topic that complies with current NESA requirements. A detailed marking rubric is required for the formal Exam. This should also include fully worked solutions.</p> <p>Students are required to write a brief justification for their assessment task explaining how their task was developed and why they are appropriate for the learning outcomes in their topic. They should also address how the assessment task will reveal possible student misconceptions.</p> <p>Students will be required to present the justification of the task selection/creation and one (1) of the harder questions in the assessment task, as a verbal/interactive presentation to the class.</p>
<b>Weighting</b>	50%
<b>Length</b>	2500 words
<b>Due Date</b>	Friday, Week 6, 11.59pm
<b>Submission Method</b>	Online Students will submit their assignment via Turnitin link located in the canvas portal for EDUC3090
<b>Assessment Criteria</b>	Students are assessed on the quality and coherence of their teaching program and assessment tasks. High quality submissions will demonstrate critical thinking and judgement, and an innovative approach to programming and careful alignment of learning outcomes with assessment tasks.
<b>Return Method</b>	Specific Location
<b>Feedback Provided</b>	Returned Work - Monday Week 10 via canvas.

## Assessment 2 - Assignment 2

<b>Assessment Type</b>	Written Assignment
<b>Purpose</b>	The purpose of this assignment is to allow students to use cognitive and technical skills to demonstrate a broad understanding of a body of knowledge relating to the impact of language in the mathematics classroom and how to develop assessments.
<b>Description</b>	<p>Students will select one topic from the NSW Stage 6 Mathematics Extension 1 or 2 syllabus.</p> <p>There are three related assessment components for Assessment Task 2:</p> <ol style="list-style-type: none"><li>Students create an investigative assessment linked to deep understanding and Higher order thinking from a topic in the stage 6 extension Mathematics syllabus. The Assessment needs to have a marking rubric and an example solution for the task.</li><li>Students need to identify the literacy requirements for this topic and how to analyse how this can be addressed in the classroom.</li><li>A full coding of the created task using the Quality Teaching Model fully referenced with current quality literature.</li></ol>

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<b>Weighting</b>	50%
<b>Length</b>	2,500 words
<b>Due Date</b>	Friday, Week 12, 11.59pm
<b>Submission Method</b>	Online Students will submit their assignment via Turnitin link located in the Canvas portal for EDUC3090
<b>Assessment Criteria</b>	Students are assessed on how well they: 1. clearly identify, explain and analyse the language issues evident within their topic; 2. plan effective and innovative assessment and resources for accommodating diversity among learners; 3. communicate their critical analysis, thinking, judgement and understanding.
<b>Return Method</b>	Specific Location
<b>Feedback Provided</b>	Returned Work - 5pm Monday Week 15 via canvas.

## 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.

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

### 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.

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**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. Please see the [Student Academic Integrity Policy](#) for more information.

**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:

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](#)

**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](#) 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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# EDUC3090 SPECIALIST STUDIES IN MATHEMATICS 2

## Assessment Tasks

### Assessment Task 1

DEVELOPMENT AND ASSESSMENT OF A UNIT OF WORK FOR SENIOR STUDENTS

You will be allocated one topic from the Stage Six NSW **Advanced** Mathematics course:

This will be allocated week one during tutorials. these will also be displayed on Canvas in the discussion group at the beginning of week 2 for students to confirm

You will be required to develop a **teaching program for the topic and One formal assessment task** and **justify** your selections

**The teaching program** will consist of

a scope and sequence for the year to see where you have placed the topic in the overall structure of the syllabus.

a program with the syllabus and lesson outcomes identified for each lesson, resources needed, content taught, assessment for each lesson, reflection of lesson and whole unit. interesting resources.

This needs to be a working document that can be used and adapted in a school setting. (examples of the types of documents will be available in tutorials and some basic proformas are present in the assessment portal on Canvas)

**The formal assessment task.**

These tasks are to be **developed by you** and **not** be past HSC questions, from Textbooks or the internet

### Assessment Task Test

This Task is be an exam i.e. a traditional class test. this test should take students **No Longer than 60 minutes** to complete the ideal time frame is 40 – 50 minutes. Please note you will be not able to assess every part of the topic in this time frame. You are expected to explore why you have the questions and the types of questions in your brief justification

This task requires fully worked solutions to be also included. Note: if you have multiple choice questions the letter is not a fully worked solution this assessment is to by typed using appropriate software.

When writing your solutions, you need to have a non-ambiguous marking guideline present so that any individual marking a paper would get the same results (this is a very complex task and we will be looking at it in tutorials)

### Brief Justification

You are required to write a brief justification for your tasks explaining how and why they are appropriate for the learning outcomes in your topic. (maximum 500 words).

# **EDUC3090 SPECIALIST STUDIES IN MATHEMATICS 2**

## **Assessment Tasks**

### **Student Misconceptions**

You should also address how your assessment tasks will reveal possible student misconceptions. (maximum 500 words).

### **Presentation**

You are required to present the justification of the task selection/creation and one (1) of the harder questions in the assessment task, as a verbal/interactive presentation to the class

**This will take place in tutorials Week 6 and 7(5 minutes).**

**Please Note:** APA 7<sup>th</sup> Edition referencing is Required in the Justification/ Misconceptions sections and Syllabus references are required in the program and Assessment Tasks



# EDUC3090 SPECIALIST STUDIES IN MATHEMATICS 2

## Assessment Tasks

### ASSESSMENT TASK ONE RUBRIC

Criteria	Pre-structural (0-50%)	Uni-structural (50-64%)	Multi-structural (65-74%)	Relational (75-84%)	Extended abstract (85-100%)
<b>Program</b>  <b>(15 marks)</b>	<p>The program is poorly set out and is difficult to follow.</p> <p>The program does not follow the conventions of the task</p> <p>The program is not comprehensive, accessible, clear and/or realistic.</p> <p>The program does not cover the allocated topic</p>	<p>The program is on topic and is reasonably well set out and easy to follow.</p> <p>The program is not comprehensive but is clear and realistic.</p> <p>The program looks at the assessment required in each lesson and the unit as a whole in a surface manner.</p> <p>Timing and lesson sequence minor issues</p>	<p>The program is on topic and is well set out and easy to follow.</p> <p>The program is mostly comprehensive, accessible, clear and realistic.</p> <p>Sequence Timing and Assessment satisfy the requirements of Implementation in a stage 6 setting</p>	<p>The program is on topic and is well set out.</p> <p>The program is comprehensive, accessible, clear and realistic.</p> <p>Sequence Timing and Assessment satisfy the requirements of Implementation in a stage 6 setting.</p> <p>Syllabus and lesson outcome are present for each lesson</p>	<p>The program is on topic and is well set out</p> <p>The program is comprehensive, accessible, clear and realistic.</p> <p>Sequence Timing and Assessment within the program satisfy the requirements of Implementation in a stage 6 setting.</p> <p>Syllabus and lesson outcome are present for each lesson.</p> <p>The program has areas of misconceptions identified throughout</p>
<b>Exam Task</b>  <b>(20 marks)</b>	<p>The exam and Worked solutions are not set out well</p> <p>The exam is not consistent with the NESA requirements for Stage 6 Assessments</p> <p>The exam does not have clear instructions and is misaligned with the outcomes chosen.</p> <p>The exam contains little variety in terms of question types.</p> <p>The marking guidelines contain multiple errors</p> <p>The marking guidelines would be difficult for multiple markers to follow.</p>	<p>The exam is reasonably well set out,</p> <p>The exam has reasonably clear instructions and is mostly suitable for the outcomes chosen.</p> <p>The exam contains some questions of different types.</p> <p>The Worked solutions have no more than 5 minor errors present or one major error.</p> <p>The marking guidelines are mostly correct, fair.</p> <p>The marking guidelines could be consistently interpreted by multiple markers.</p>	<p>The exam is mostly well set out,</p> <p>The exam has clear instructions and is mostly suitable for the outcomes chosen.</p> <p>The exam contains at least some questions of different types.</p> <p>The Worked solutions have no more than 2 minor errors present no major errors.</p> <p>The marking guidelines are mostly fair for the work required.</p> <p>The marking guidelines could be consistently interpreted by multiple markers.</p>	<p>The exam is well set out,</p> <p>The exam has clear instructions and is suitable for the outcomes chosen.</p> <p>The exam contains at questions of different types.</p> <p>The Worked solutions have no errors present.</p> <p>The marking guidelines are mostly fair for the work required.</p> <p>The marking guidelines could be consistently interpreted by multiple markers.</p> <p>The exam timing is appropriate.</p>	<p>The exam is very well set out, is comprehensive, has clear instructions and is suitable for the outcomes chosen.</p> <p>The exam contains a range of questions and is well timed.</p> <p>The marking guidelines are correct, fair and could be consistently interpreted by multiple markers.</p>

# EDUC3090 SPECIALIST STUDIES IN MATHEMATICS 2

## Assessment Tasks

<b>Justification</b> <b>(5 marks)</b>	<p>The justification is weak or not present.</p> <p>There is no academic support present to justify your argument does not reference (using APA style)</p>	<p>The justification is limited and has some academic support.</p> <p>The justification discusses how the learning outcomes have been linked to the assessment tasks, making basic reference to the principles of assessment and relevant taxonomies.</p>	<p>The justification is sound and references (using APA style) suitable supporting documents.</p> <p>The justification discusses how the learning outcomes have been linked to the assessment tasks, making some reference to the principles of assessment and relevant taxonomies.</p>	<p>The justification is well developed and references (using APA style) suitable supporting documents.</p> <p>The justification explains how the learning outcomes have been linked to the assessment tasks, referring to the principles of assessment and relevant taxonomies.</p>	<p>The justification is highly developed and references (using APA style) suitable supporting documents.</p> <p>The justification thoughtfully explains how the learning outcomes have been linked to the assessment tasks, referring to the principles of assessment and relevant taxonomies.</p>	
<b>Misconceptions</b> <b>(5 marks)</b>	<p>You have not addressed any misconceptions that may arise from this topic</p> <p>There is no academic support present to justify your argument</p>	<p>You have identified one or two misconceptions but not integrated the topic as a whole.</p> <p>The discussion identifies how to address the misconceptions when teaching this topic however there is little academic support present to justify your argument</p>	<p>You have identified some connected misconceptions.</p> <p>The discussion identifies how to address the misconceptions when teaching this topic there is academic support present to justify your argument.</p>	<p>You have identified some misconceptions.</p> <p>The discussion identifies how to address the misconceptions when teaching this topic.</p> <p>There is academic support present to justify your argument.</p>	<p>You have identified some misconceptions.</p> <p>The discussion identifies how to address the misconceptions when teaching and assessing this topic</p> <p>Strong academic support is present</p>	<b>4</b>
<b>Presentation</b> <b>(5 marks)</b>	<p>The Presentation does not present the justification of the task selection or clearly explain the chosen question.</p> <p>Or not all required areas presented.</p>	<p>The presentation is partly engaging for students and explains the chosen question in a manner that would be engaging for some students. The justification of the task selection/creation is clear and aligns with Assessment guidelines.</p>			<p>The presentation is of the justification of the task selection/creation and assessment question is engaging and clear for students</p>	

Comments:

# EDUC3090 SPECIALIST STUDIES IN MATHEMATICS 2

## Assessment Tasks

### ASSESSMENT TWO

DEVELOPMENT OF INVESTIGATIVE ASSESSMENT AND LITERACY USAGE FOR SENIOR EXTENSION STUDENTS

You will select one topic from the NSW Stage 6 Mathematics Extension 1 or 2 syllabus and upload your selection to discussion board

There are three related assessment components for Assessment Task 2:

1. Assessment Task

You will develop an investigative formal assessment linked to deep understanding and Higher order thinking from a topic in the stage 6 extension Mathematics syllabus.

The Assessment needs to have a marking rubric and an example solution for the task and fit the requirement of investigative tasks per NESA guidelines

2. Literacy

You will identify the literacy requirements for this topic and write an analysis on how this can be addressed in the classroom fully researched.

3. Analysis of Task

You will provide a full coding of the created task using the Quality Teaching Model (Assessment guideline) fully referenced with current quality literature.

# EDUC3090 SPECIALIST STUDIES IN MATHEMATICS 2

## Assessment Tasks

### ASSESSMENT TASK 2 MARKING RUBRIC:

v	Unsatisfactory (0-49%)	Pass (50-64%)	Credit (65-74%)	Distinction (75-84%)	High Distinction (85-100%)
<b>Alternative Assessment Task</b> 15 marks	The task is not suitable for the outcomes chosen,  The task is not engaging and/or challenging and/or clearly set out.  The task does not follow the conventions as set out by NESAs.	The task follows the conventions of the NESAs requirements for stage 6 Alternate assessments.  The task is mostly suitable for the outcomes chosen.  The task is somewhat engaging and challenging.	The task follows the conventions of the NESAs requirements for stage 6 Alternate assessment.  The task is suitable for the outcomes chosen.  The task is engaging and challenging.	The task is somewhat innovative.  The task follows the conventions of the NESAs requirements for stage 6 Alternate assessment.  The task is suitable for the outcomes chosen.  The task is engaging and challenging	The task is innovative.  The task follows the conventions of the NESAs requirements for stage 6 Alternate assessments.  The task is suitable for the outcomes chosen.  The task is engaging and challenging
<b>Rubic and Exemplar</b> 15 marks	The worked student example is not present.  The rubric is not clearly set out or is unambiguous.  The rubric is difficult to follow.	The task has a worked example present.  The rubric is clearly set out and, mostly unambiguous	The task has a worked example present.  The rubric is set out and, unambiguous.  The rubric is easy to follow	The task has a marked worked example present.  The rubric is clearly set out and, unambiguous.  The rubric is very easy to follow and mostly replicates consistent results.	The task has a marked worked example present with quality feedback present.  The rubric is clearly set out and, unambiguous.  The rubric is easy to follow and replicates consistent results.
<b>Language analysis</b> 10 marks	The lesson would not be effective in addressing the language issues evident in the particular topic.  The lesson is not easy to follow.  Only some resources necessary for the delivery of the lesson are included or are explained.	. The lesson would be effective in addressing the language issues evident in the particular topic.  The lesson is reasonably easy to follow.  Only some resources necessary for the delivery of the lesson are included or are explained	The lesson would be effective in addressing the language issues evident in the particular topic.  The lesson is reasonably easy to follow.  All resources necessary for the delivery of the lesson are included or are explained	The lesson is innovative and would be effective in addressing the language issues evident in the particular topic.  The lesson is well set out and is easy to follow.  All resources necessary for the delivery of the lesson are included or are explained.	The lesson is highly original, innovative and would be effective in addressing the language issues evident in the particular topic.  The lesson is clearly set out and easy to follow.  All resources necessary for the delivery of the lesson are included or are clearly explained.
<b>Quality Teaching Model analysis of Assessment Coding</b> 10 marks	No or very superficial reflection on Quality Teaching model of Assessment.  Coding of Assessments is wrong, elements of the Quality Teaching model have been misunderstood.	Student analyses Quality Teaching model connections to the Assessment.  Coding of Assessments is appropriate, however, understanding of some elements is limited.	Student analyses Quality Teaching model connections to the Assessment.  Coding of Assessment is appropriate.	Student critically analyses Quality Teaching model connections to the Assessment.  Coding of Assessment is appropriate drawing on a range of literature.	Highly developed and Reflection on Quality Teaching model provides deep insight about planning for Assessments drawing on a wide range of specific literature

# **EDUC3090 SPECIALIST STUDIES IN MATHEMATICS 2**

## **Assessment Tasks**

Comments: