EDUC6102: Mathematics Curriculum Studies 1

Online Semester 2 - 2023



OVERVIEW

Course Description

This course introduces students to the key concepts underlying a deep understanding of algebra, functions, continuity and an introduction to calculus. This course will consider the historical development of calculus and will examine current related pedagogical models within the field of secondary mathematics.

Contact Hours	Online
	Tutorial
	Online
	2 hour(s) per Week for Full Term

10

Unit Weighting

Workload Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.



CRICOS Provider 00109J



CONTACTS

Course Coordinator	Online Miss Rebecca Smith Rebecca.Smith@newcastle.edu.au Consultation: contact via email
School Office	School of Education V Building Callaghan

+61 2 4921 6428

Education@newcastle.edu.au

SYLLABUS

Course Content	 basic algebra: simplification, factorisation, modelling, solving equations functions: definitions, graphing, continuity, limits types of functions: linear, polynomial, logarithmic, exponential rates of change: applications to graphing, definitions, symbolic representations calculus: first principles, derivatives, integration, applications teaching strategies related to mathematical content common misconceptions related to the mathematical content
Course Learning Outcomes	 On successful completion of this course, students will be able to: 1. understand key concepts related to fundamental algebra, functions, continuity and calculus; 2. appreciate the mathematical knowledge and beliefs that learners bring to a learning task; 3. apply a range of strategies for teaching secondary mathematics; and 4. recognise the common misconceptions that students may have about the mathematical content covered.
Course Materials	Lecture Materials: Lecture and/or learning materials will be made available via Canvas.
	Required Text:

- Pender. B, Sadler. D, Ward. D, Dorofaeff. B and Shea. J (2019) Cambridge MATHS Stage 6 Mathematics Extension 1 Year 11. Melbourne: Cambridge University Press. ISBN 978-1-108-46907-4
- Pender. B, Sadler. D, Ward. D, Dorofaeff. B and Shea. J (2020) Cambridge MATHS Stage 6 Mathematics Extension 1 Year 12. Melbourne: Cambridge University Press. ISBN 978-1-108-76630-2



SCHEDULE

Week Week Topic Begins		Торіс	Assessment Due
1	17 Jul	Review of Algebra	
2	24 Jul	Solving and Graphing `standard' Functions and Inequalities	
3	31 Jul	Calculus - First Principles	
4	7 Aug	Calculus - Differentiation of Polynomials	Content Assignment 1 Due 13/8/2023
5	14 Aug	Calculus - Product, Quotient and Chain Rule	Discussion Task A Due 20/8/2023
6	21 Aug	Calculus - Tangents and Normals to the Curve	Content Assignment 2 Due 27/8/2023
7 28 Aug Curve Sketching - Po		Curve Sketching - Polynomials	
8	4 Sep	Applications of Calculus - Differentiation	Content Assignment 3 Due 10/9/2023
9 11 Sep Calculus - Differentiation of T		Calculus - Differentiation of Trigonometric Functions	
10 18 Sep Calculus - Differenti Exponential Functio		Calculus - Differentiation of Logarithmic and Exponential Functions	Discussion Task B Due 24/9/2023
		Mid Term Break	
11	9 Oct	Curve Sketching - Other Functions	Discussion Task C Due 15/10/2023
12	16 Oct	Further Rates of Change	Content Assignment 4 Due 22/10/2023
13	23 Oct	Revision	Content Assignment 5 Due 27/10/2203
		Examination Period	Option 1: 3 rd November 2023 10-12pm Option 2: 5 th November 2023 1-3pm

ASSESSMENTS

This course has 3 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Mathematics Content Examination	Student will select one of two times designated for the exam, these times are either Friday 3 rd November 2023 10-12pm or Sunday 5 th November 2023 1-3pm. You will book into one of these exam time via the EDUC6102 Canvas site.	Individual	40%	1
2	Mathematics Content Assignments	CA 1: 13 th August 2023 @ 11:59PM CA 2: 27 th August 2023 @ 11:59PM CA 3: 10 th September 2023 @ 11:59PM CA 4: 22 nd October 2023 @ 11:59PM CA 5: 27 th October 2023 @ 11:59PM	Individual	40%	1
3	Online Discussion Task	Discussion Task (A) Due 20 th August 2023 11:59PM Discussion Task (B) Due 24 th September 2023 11:59PM Discussion Task (C) Due 15 th October 2023 11:59PM	Individual	20%	1, 2, 3, 4

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 – Mathematics Content Examination

Assessment Type Purpose Description	In Term Test Final Exam: This exam will cover content in modules 1 - 12. Examination questions will be based on the course material provided, including suggested mathematical exercises. The examination will consist of a two (2) hour paper. The Semester 2 2023 the EDUC6102 final exam will be a formal written exam. Details will be made available on the course Canvas site. Students are to select from one of two specified days/times in which to sit their exam. These exams will be supervised remotely (using Zoom) by the course coordinator.
Weighting	40%
Length	2 hours
Due Date	Student will select one of two times designated for the exam, these times are either Friday 3 rd November 2023 10-12pm or Sunday 5 th November 2023 1-3pm. You will book into one of these exam time via the EDUC6102 Canvas site.
Submission Method	Online Completed assessment will be scanned and uploaded to Canvas
Assessment Criteria	Assessment will not be marked until all submission requirements are met. Students' examination responses will be marked according to the marking scheme provided on the examination paper. Each question will be marked according to the accuracy of the answer provided and the clarity of the setting out of the response.
Return Method	Not Returned
Feedback Provided	Online -Students can request feedback from the course coordinator after all exams have been sat and marked.

Assessment 2 – Mathematical Content Assignments

Assessment Type	Written Assignment
Purpose	This task consists of a mathematics content assignment in five parts to demonstrate your understanding of the material presented in Topics 1 to 12.
Description	The task will be presented to you as a series of online tests that will be posted in Canvas. There will be a total of 5 of such tests. Each test will be divided up into two sections, a multiple choice section (5%) and a long response section (3%). Long response assessments must be submitted electronically in a PDF (or word document) format via Turnitin. These written assignments must be typed using appropriate mathematical software (efofex, word equation etc.) Scanned handwritten answers will not be marked.
Weighting	40%
Length	See Canvas Site
Due Date	CA 1: Sunday 13 th August 2023 @ 11:59PM AEST
	CA 2: Sunday 27 th August 2023 @ 11:59PM AEST
	CA 3: Sunday 10th September 2023 @ 11:59PM AEST
	CA 4: Sunday 22 nd October 2023 @ 11:59PM AEST
	CA 5: Friday 27 th October 2023 @ 11:59PM AEST
Submission Method	Online
Assessment Criteria	Each question will be marked according to the accuracy of the answer provided and the clarity of the setting out of the response. Providing answers only will result in zero marks.
Return Method	Online
Feedback Provided	Online - Two weeks after each due date.

Assessment 3 - Online Discussion Task

Assessment Type	Online Learning Activity		
Purpose	This task consists of an online discussion task designed for you to appreciate the mathematical knowledge and beliefs that learners bring to a learning task. It will show a range		
	of strategies for teaching secondary mathematics. You will need to recognise some common misconceptions that students may have regarding the mathematical content covered.		
Description	This task consists of three parts and is aimed at Stage 4 level Mathematics:		
Focus pedagogy: Lesson planning and teaching strategies			
	Focus strand: Number and Algebra		
	Focus Stage: 4		



	Part A: Review the Stage 4 Equations Topic -
	https://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/learning-
	areas/mathematics/mathematics-k-10/content/786
	Part B: Choose a teaching strategy from the list provided which you believe will assist students with the topic above. Explain why you have chosen this strategy and how you believe it is appropriate for the lesson you will create. Justify your argument with links to academic literature (10 marks) Part C: Write a lesson plan using the strategy you have chosen. In your lesson plan please
	include any relevant information such as prior knowledge or links to other topics/subject areas (10 marks)
Weighting Length Due Date	20% Varies – See Canvas site Canvas Discussion Task (A) Due 20 th August 2023 11:59PM Canvas Discussion Task (B) Due 24 th September 2023 11:59PM Canvas Discussion Task (C) Due 15 th October 2023 11:59PM
Submission Method	Online
Assessment Criteria	Assignment will not be marked until all submission requirements are met. A marking rubric will be available on the EDUC6102 Canvas site
Return Method	Online
Feedback Provided	Online - Two weeks after due date.

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.



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 <u>Oral Examination (viva)</u> <u>Procedure</u> . 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 <u>Student Conduct Rule</u> .
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: the assessment item is a major assessment item; or 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; you are requesting a change of placement; or 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/no-room-for/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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EDUC6102

Focus pedagogy: Lesson planning and teaching strategies

Focus strand: Number and Algebra

Focus Stage: 4

This task will consist of 3 parts

- a) Review the Stage 4 Equations Topic <u>https://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/learning-areas/mathematics/mathematics-k-10/content/786</u>
- b) Choose a teaching strategy from the list provided which you believe will assist students with the topic above. Explain why you have chosen this strategy and how you believe it is appropriate for the lesson you will create. Justify your argument with links to academic literature (10 marks)
- c) Write a lesson plan using the strategy you have chosen. In your lesson plan please include any relevant information such as prior knowledge or links to other topics/subject areas (10 marks) Discussion Task worth 20% of your final grade for this course.

Criteria		Possible Marks
<u>Part B</u>	 The response will be given a mark out of ten depending on the degree to which: the content is discussed thoughtfully and with insight (5) the key strategies are identified and/or questions answered (3) the response is written clearly and without grammatical errors using correct academic referencing. (2) 	10
<u>Part C</u>	 The response will be given a mark out of ten depending on the degree to which: the content of the lesson plan is clear, concise, and relevant (5) Links to prior knowledge and other subject areas (3) the response is written clearly without grammatical errors using correct academic referencing/resources used clearly stated. (2) 	10

The rubric below will be used for each task to determine your mark out of 10 for both Parts B and C.

 material is given and properly referenced. Excellent writing skills and proper use of grammar. Demonstrates a high level of composition skills including a clear and well thought out response to the set question. Key issues are identified and explained with supporting materia reference material is given and properly referenced. The student has used appropriate writing skills and grammar. Demonstrates a good level of composition skills including a clear and well thought out response to the set question. Key issues are identified and explained with supporting materia reference material is given and properly referenced. The student has used appropriate writing skills and grammar. Demonstrates a good level of composition skills including a clear and well thought out response to the set question. Key issues are identified and explained with supporting materia reference material is given and properly referenced. The student has used appropriate writing skills and grammar Demonstrates a good level of composition skills including a clear and well thought out response to the set question. Key issues are identified and explained with supporting materia reference material is given and properly referenced. The student has used appropriate writing skills and grammar 	variety of reference
 9 Demonstrates a high level of composition skills including a clear and well thought out response to the set question. Key issues are identified and explained with supporting material is given and properly referenced. The student has used appropriate writing skills and grammar. 8 Demonstrates a good level of composition skills including a clear and well thought out response to the set question. Key issues are identified and explained with supporting material reference material is given and properly referenced. The student has used appropriate writing skills and grammar. 7 Demonstrates a good level of composition skills including a clear and well thought out response to the set question. Key issues are identified and explained with supporting material is given and properly referenced. The student has used appropriate writing skills and grammar 	
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7 Demonstrates a good level of composition skills including a clear and well thought out response to the set question. Key issues are identified and explained with supporting material	
	al. Reference material
is given and properly referenced yet is not diverse in its source. The student has used appropriate writing skills and grammar	
6 Demonstrates a good level of composition skills including a clear and well thought out response to the set question. Key issues are identified and explained. Reference material is	iven and properly
referenced yet is not diverse in its source. The student has used appropriate writing skills and grammar.	
5 Demonstrates an adequate level of composition skills including and has answered the set question. Key issues are identified and explained. Reference material is given and proper	y referenced yet is not
diverse in its source. The student has used appropriate writing skills and grammar.	
4 Demonstrates an adequate level of composition skills and has answered the set question. Key issues are identified but not explained fully. Reference material is given yet is not div	erse in its source. The
student has used appropriate writing skills and grammar.	
3 Demonstrates an adequate level of composition skills including a clear and has answered the set question. Key issues are identified but not explained fully. Reference material is la	cking/limited and not
diverse in its source.	
2 Demonstrates a basic level of composition skills and has attempted to answer the set question. Reference material is lacking/limited and not diverse in its source.	
1 Demonstrates a basic level of composition skills yet has not answered the set question. Reference material is lacking/limited and done not show diversity of knowledge.	
0 No attempt has been made to complete this assessment	