School of Education

EDUC6103: Mathematics Curriculum Studies 2

Online

Semester 1 - 2024

COURSE OUTLINE

OVERVIEW

Course Description

This course introduces students to the key concepts underlying a deep understanding of number, arrangements, number distribution and combinatorics. This course will consider the historical development of number and will examine current related pedagogical models within the field of secondary mathematics, including assessment policy and structure.

Academic Progress Requirements

Nil

Contact Hours

Online
Tutorial
Online
2 hour(s) per week(s) for 13 week(s) starting Week 1

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.

CONTACTS

Course Coordinator **Online**
Miss Rebecca Smith
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School Office **School of Education**
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SYLLABUS

Course Content

- Basic number theory including modular arithmetic
- Permutations and Combinations theory (combinatorics) and applications to probability and games of chance
- Binomial distribution and its relationship to algebraic expansion and probability
- Difference equations and applications to Fibonnacci numbers and linear algebra
- Teaching strategies related to mathematical content
- common misconceptions related to the mathematical content
- Assessment requirements of the Board of Studies NSW

Course Learning Outcomes

On successful completion of this course, students will be able to:
1. understand the key concepts related to number theory, combinatorics, binomial theory and difference equations;
2. appreciate the mathematical knowledge and beliefs that learners bring to a learning task;
3. apply a range of strategies for teaching secondary mathematics;
4. recognise the common misconceptions that students may have in regard to the mathematical content covered; and
5. apply a range of strategies for assessing students learning.

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) CambridgeMATHS 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) CambridgeMATHS Stage 6 Mathematics Extension 1 Year 12. Melbourne: Cambridge University Press. ISBN 978-1-108-76630-2
- Sadler. D and Ward. D (2020) CambridgeMATHS Stage 6 Mathematics Extension 2 Year 12. Melbourne: Cambridge University Press. ISBN 978-1-108-77105-4

SCHEDULE

Week	Week Begins	Topic	Assessment Due
1	26 Feb	Modular Congruence	
2	4 Mar	Fermat's Little Theorem and Applications	
3	11 Mar	Cryptography	Content Assignment 1 Due: Sunday 17/3/2024 11:59PM AEST on Topics 1 and 2
4	18 Mar	Chinese Remainder Theorem	Canvas Discussion Task (A) Due: Sunday 24/3/2024 11:59PM AEST
5	25 Mar	Tree Diagrams and The Multiplication Principle	
6	1 Apr	Counting and Permutations	Content Assignment 2 Due: Sunday 7/4/2024 11:59PM AEST on Topics 3, 4 and 5
7	8 Apr	Restrictions and Repetitions	Canvas Discussion Task (B) Due: Sunday 14/4/202411:59PM AEST
Mid Term Break			
8	29 Apr	Arrangements and Probability	Content Assignment 3 Due: Sunday 5/5/2024 11:59PM AEST
9	6 May	Binomial Distributions and Applications	Canvas Discussion Task (C) Due: Sunday 12/5/2024 11:59PM AEST
10	13 May	Limits to our Number System - Complex Numbers	
11	20 May	The Complex Number Plane	Content Assignment 4 Due: Sunday26/5/2024 11:59PM AEST on Topics 8, 9 and 10
12	27 May	Complex Numbers - Alternative Forms of Representation	Exam Date Due Friday 31/5/2024 5PM AEST
13	3 June		Content Assignment 5 Due: Friday 7/6/2024 5PM AEST on Topics 11 and 12
Exam Thursday 13th June 2024 10am-1pm or Saturday 15th June 2024 1-4pm			

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 Thursday 13th June 2024 10am-1pm or Saturday 15th June 2024 1-4pm. You will book into one of these exam time via the EDUC6103 Canvas site.	Individual	40%	1, 2
2	Content Assignment (in five parts)	CA1 Sunday 17/3/2024 @ 11:59PM CA2 Sunday 7/4/2024 @ 11:59PM CA3 Sunday 5/5/2024 @ 11:59PM CA4 Sunday 26/5/2024 @ 11:59PM CA5 Friday 7//2024 @ 5PM	Individual	40%	1, 2, 4, 5
3	Online Discussion Task	Canvas Discussion Task (A) Due: Sunday 24/3/2024 11:59PM Canvas Discussion Task (B) Due: Sunday 14/4/2024 11:59PM Canvas Discussion Task (C) Due: Monday 12/5/2024 11:59PM	Individual	20%	2, 3, 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 - Mathematics Content Examination

Assessment Type In Term Test
Purpose Final Exam: This exam will cover content in modules 1 - 12.
Description Examination questions will be based on the course material provided, including suggested mathematical exercises. The examination will consist of a three (3) hour paper. In Semester 1 2024 the EDUC6103 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 Three hours
Due Date Student will select one of two times designated for the exam, these times are either Thursday 13th June 2024 10-1pm or Saturday 15th June 2024 1-4pm. You will book into one of these exam time via the EDUC6103 Canvas site.
Submission Method Online
Completed assessment will be scanned and uploaded to Canvas.
Assessment Criteria Assessment will not be marked until any and 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 - Content Assignment

Assessment Type	Written Assignment
Purpose	This task consists of 5 mathematics content assignment (worth 8% each) and will cover the material presented in Topics 1 to 12.
Description	These assignments will require the student to complete a list/set of questions related to the course material. These questions will be made available on Canvas and cover all modules within the course. These assignments must be submitted electronically in a word document format via Turnitin. These assignments must be typed using appropriate mathematical software (efofex, word equation etc.) Scanned handwritten answers will not be marked.
Weighting	40%
Length	See Canvas
Due Date	CA 1: Sunday 17/3/2024 @ 11:59PM CA 2: Sunday 7/4/2024 @ 11:59PM CA 3: Sunday 5/5/2024 @ 11:59PM CA 4: Sunday 26/5/2024 @ 11:59PM CA 5: Friday 7/6/2024 @ 5PM
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 content assignment.

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 has the following focus areas: Focus pedagogy: Formal and informal individual assessment Focus strand: Statistics and Probability Focus Stage: 6 a) Review the extension topic **ME-A1: Working with Combinatorics** https://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/stage-6-learning-areas/stage-6-mathematics/mathematics-extension-1-2017/content/2651 (Also see Mathematics Extension 1 - Year 11 - Topic guide - Combinatorics). b) Using the Sample Formal Assessment Task document (link on Canvas) write an individual assessment task on a subtopic of **ME-A1**. In your task include any relevant information such as prior knowledge or links to other topics/subject areas. (10 marks) c) Using any format you wish; write an informal individual assessment for the same subtopic you used in part (b). Include a brief discussion of the rationale of the type of assessment chosen and any marking rubrics. The assessment must show/reference real-world applications of the material covered. A marking rubric is to be included with the assessment activity (10 marks)
Weighting	20%
Length	Variable.
Due Date	Canvas Discussion Task (A) Due: Sunday 24/3/2024 11:59PM AEST Canvas Discussion Task (B) Due: Sunday 14/4/2024 11:59PM AEST Canvas Discussion Task (C) Due: Sunday 12/5/2024 11:59PM AEST
Submission Method	Online
Assessment Criteria	Assignment will not be marked until any and all submission requirements are met. A marking rubric will be provided for this assessment
Return Method	Online
Feedback Provided	Online - Two weeks after each component is completed.

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:

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:

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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Focus pedagogy: Formal and informal individual assessment
Focus strand: Statistics and Probability
Focus Stage: 6
This task will consist of 3 parts

a) Review the extension topic ME-A1: Working with Combinatorics https://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/stage-6-learning-areas/stage-6-mathematics/mathematics-extension-1-2017/content/2651 (Also see Mathematics Extension 1 - Year 11 - Topic guide - Combinatorics).
b) Using the Sample Formal Assessment Task document (link on Canvas) write an individual assessment task on a subtopic of ME-A1. In your task include any relevant information such as prior knowledge or links to other topics/subject areas (10 marks)
c) Using any format you wish, write an informal individual assessment for the same subtopic you used in part (b). Include a brief discussion of the rationale of the type of assessment chosen and any marking rubrics. The assessment must show/reference real-world applications of the material covered. (10 marks)

Discussion Task worth 20% of your final grade for this course.

Criteria		Possible Marks
Part B	The response will be given a mark out of ten depending on the degree to which: • the content of the formal individual assessment 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
Part C	The response will be given a mark out of ten depending on the degree to which: • the content of the informal individual assessment is clear, concise, and relevant (5) • Links to prior knowledge and other subject areas/ links to real world applications (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.

10	Demonstrates excellent composition skills including a clear and thought-provoking response to the set question. Key issues are identified and explained with supporting material. A variety of reference material is given and properly referenced. Excellent writing skills and proper use of grammar.
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. A variety of reference 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. A use of different 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. 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 given 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 properly 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 diverse 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 lacking/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