

MATH3920: Thinking and Working Mathematically

Callaghan

Semester 1 - 2024



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

OVERVIEW

Course Description	Provides students in Education programs with an insight into the nature of problem-solving in mathematics. In particular, within the scope of the mathematics they have studied, the students will become aware of the process of using mathematics in open-ended problems, the way in which new mathematics can be developed, and mathematics as a human endeavour. Encourages students to think mathematically and increase students' confidence in their mathematical ability.
Academic Progress Requirements	Nil
Requisites	If you have successfully completed MATH2920 you cannot enrol in this course.
Assumed Knowledge	MATH1900 or another 1000-level MATH course
Contact Hours	Callaghan Integrated Learning Session Face to Face On Campus 2 hour(s) per week(s) for 13 week(s) starting Week 1 The activities in this session will include lecture delivery and hands-on workshops. Online Activity Online 2 hour(s) per week(s) for 13 week(s) starting Week 1 6 additional 2hr Help session workshops will be scheduled due to the size of the course.
Unit Weighting Workload	10 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 Andrew Kepert
Andrew.Kepert@newcastle.edu.au

(02) 4348 4116

Consultation: Appointments can be made for Thursdays at Callaghan by arrangement. At other times please get in touch to arrange an online meeting.

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

School Office **School of Information and Physical Sciences**
SR233, Social Sciences Building
Callaghan
CESE-SIPS-Admin@newcastle.edu.au

+61 2 4921 5513
9am-5pm (Mon-Fri)

SYLLABUS

Course Content

- Working mathematically - approaches to problem-solving
- Thinking mathematically - problem-posing, generalising, conjecturing, linking.

Course Learning Outcomes **On successful completion of this course, students will be able to:**

1. Undertake an investigation into a problem arising from a pure mathematics setting
2. Undertake a mathematical investigation into a problem arising from a setting outside of mathematics
3. Reflect on the relationship between thinking and working mathematically and mathematics education

Course Materials

SCHEDULE

Week	Week Begins	Topic	Learning Activity	Assessment Due
1	26 Feb	Introduction	Thursday class: Thinking and Working Mathematically	Assignment 3 handed out
2	4 Mar	Investigating	Preparation: Problem Solvers Thursday class: Specialising, Conjecturing, Generalising	
3	11 Mar	Reasoning	Preparation: Communicating Thursday class: Convincing, Reviewing, Reflecting	
4	18 Mar	Working	Preparation: Organised scribbling Thursday class: Workshop on a trial problem	
5	25 Mar	Assignment 1	Preparation: Consolidating Thursday class: Working an	Assignment 1 questions handed out

			a possible question for assignment 1	
6	1 Apr	Assignment 1	Preparation: Continued work on Week 5 problem. Thursday class: Working on a second possible question for assignment 1	Assignment 1 questions handed out
7	8 Apr	Applying Mathematics	Preparation: Continued work on Week 6 problem and assignment. Thursday class: Applied problems	Assignment 1 due
Mid-Semester Recess				
Mid-Semester Recess				
8	29 Apr	Modelling	Preparation: Modelling. Thursday class: Modelling cycle, refining and reporting.	
9	6 May	Working with models	Preparation: Types of model Thursday class: Workshop on a trial applied problem.	
10	13 May	Assignment 2	Thursday class: Working on a possible question for assignment 2.	Assignment 2 questions handed out
11	20 May	Assignment 2	Preparation: Continued work on Week 10 problem and assignment. Thursday class: Working on a second possible question for assignment 2.	Assignment 2 questions handed out
12	27 May	Facilitating	Preparation: Continued work on Week 11 problem and assignment. Thursday class: Facilitating Working Mathematically.	Assignment 2 due
13	3 Jun	Conclusion	Preparation: Work on assignment. Class: Feedback, reflection on course.	Assignment 3 due
Examination Period				
Examination Period				

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	Assignment 1	Friday of week 7: 12th of April 2024	Individual	40%	1
2	Assignment 2	Friday of Week 12: 31st of May 2024	Individual	40%	2
3	Assignment 3	Friday of Week 13: 7th of June 2024	Individual	20%	3

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 - Assignment 1

Assessment Type Written Assignment

Purpose	An opportunity to solve an open-ended problem in Mathematics and create a piece of written work that embodies the principles and methods from the course.
Description	A pure mathematics investigation. The assignment includes a complete record of work on a problem. The problem has a mathematical context, and the work includes initial investigation, formal written presentation and a reflection on the processes undertaken. This is a major assessment item, so students requiring an extension or other adjustment should use the online Adverse Circumstances system.
Weighting	40%
Due Date	Friday of week 7: 12th of April 2024
Submission Method	Online
Assessment Criteria	A detailed rubric is available on Canvas
Return Method	Online
Feedback Provided	Online - . Feedback will be provided via the rubric, written comments and a discussion in class.
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 2 - Assignment 2

Assessment Type	Written Assignment
Purpose	An opportunity to solve an open-ended problem in Applied Mathematics and create a piece of written work that embodies the principles and methods from the course.
Description	An applied mathematics investigation. The assignment includes a complete record of work on a problem. The problem has a real-world context, and the work includes initial investigation, formal written report and a reflection on the processes undertaken. This is a major assessment item, so students requiring an extension or other adjustment should use the online Adverse Circumstances system.
Weighting	40%
Due Date	Friday of Week 12: 31st of May 2024
Submission Method	Online
Assessment Criteria	A detailed rubric is available on Canvas
Return Method	Online
Feedback Provided	Online - . Feedback will be provided via the rubric, written comments and a discussion in class.
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 3 - Assignment 3

Assessment Type	Written Assignment
Purpose	An opportunity to investigate how thinking and working mathematically connects to classroom practice and educational outcomes.
Description	Relating to the classroom. A formal essay that draws connections between the processes of thinking and working mathematically, their potential within a teaching context, and outcomes for mathematics education. Although this is a minor assessment item, students requiring an extension or other adjustment should use the online Adverse Circumstances system.
Weighting	20%
Due Date	Friday of Week 13: 7th of June 2024
Submission Method	Online
Assessment Criteria	A detailed rubric is available on Canvas
Return Method	Online
Feedback Provided	Online - . Feedback will be provided via the rubric, and written comments
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

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.

The principal communication in the course is the weekly face-to-face class.

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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