



# EDST2110

## Principles of Maths, Science and Technology Education

Session 2, In person-scheduled-infrequent, North Ryde 2023

*Macquarie School of Education*

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#### **Disclaimer**

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## General Information

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Credit points

10

Prerequisites

80cp including (EDST100 or EDST1000) and (EDST101 or EDST1010) and admission to (BABEd(Prim) or BEd(Prim)BPsych)

Corequisites

Co-badged status

Unit description

This unit develops teacher education students' pedagogical content knowledge (PCK) and understanding of the aims, content and pedagogy of the NSW Mathematics K-6 and Science and Technology K-6 syllabi. Within the context of the Australian Curriculum in Mathematics, Science, and Digital Technologies, the unit focuses on the scope and depth of appropriate teaching and learning content and pedagogies. Using relevant contexts (including sustainability), teacher education students develop their numeracy and scientific literacy through the processes of Design and Production, Working Mathematically and Working Scientifically. A research-based approach supports teacher education students' understanding of primary students' conceptual and developmental stages of learning and learning progressions, and builds the ability to interpret research findings both in science and mathematics education.

## Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

## Learning Outcomes

On successful completion of this unit, you will be able to:

**ULO1:** Explain the current research foundations of the mathematical, scientific, design and computational thinking of students.

**ULO2:** Articulate pedagogical principles for developing students' mathematical, scientific and computational thinking skills with reference to educational research and practice.

**ULO3:** Interpret and explain key concepts/principles/approaches/developmental progressions in NSW syllabuses for mathematics, science and technology.

**ULO4:** Critically reflect upon the efficacy of learning resources and approaches to develop mathematical, scientific and technological skills and concepts.

**ULO5:** Develop understanding of the requirements of a Graduate Teacher.

## General Assessment Information

- Students should be aware of and apply the University policy on academic honesty (see: <https://policies.mq.edu.au/document/view.php?id=3>)
- Unless a Special Consideration (see: <https://students.mq.edu.au/study/assessment-exams/special-consideration>) request has been submitted and approved, a 5% penalty (of the total possible mark) will be applied each day a written assessment is not submitted, up until the 7th day (including weekends). After the 7th day, a mark of, 0 (zero) will be awarded even if the assessment is submitted. Submission time for all written assessments is set at 23:55. A 1-hour grace period is provided to students who experience a technical issue. This late penalty will apply to non-timed sensitive assessment (incl essays, reports, posters, portfolios, journals, recordings etc).
- Late submission of time sensitive tasks (such as tests/exams, performance assessments/presentations, scheduled practical assessments/labs etc) will only be addressed by the unit convenor in a Special consideration application. Special Consideration outcome may result in a new question or topic.
- Please format assessments using 12-point font and 1.5 spacing.
- All assessments are submitted electronically. Turnitin plagiarism and AI detection software is used to check all written assessments.
- Students can use Turnitin's Originality Report as a learning tool to improve their academic writing if this option is made available in the unit.
- Students should carefully check that they submit the correct file for an assessment as no re-submissions will be accepted after the due date and time, including instances where students upload an incorrect file in error.
- Word limits are strictly applied. Work above the word limit will not be marked.
- All assessments are marked using a clear marking scheme or a rubric.
- Marking of all assessments is moderated by the Unit Convenor.
- Applications for extensions must be made via AskMQ (<https://ask.mq.edu.au/>).
- It is not the responsibility of unit staff to contact students who have failed to submit assessments. If you have any missing items of assessment, it is your responsibility to make contact with the unit convenor.

## University policy on grading

### Criteria for awarding grades for assessment tasks

Assignments will be awarded grades ranging from HD to F according to guidelines set out in the University's Grading Policy. For Professional Experience units the PE Report is marked as satisfactory or unsatisfactory and the Teaching Performance Assessment (in final PE units) is marked as not meets, meets or exceeds. The following descriptive criteria are included for your information.

### Descriptive Criteria for awarding grades in the unit

In order to meet the unit outcomes and successfully pass this unit, students must make a genuine attempt at all assessment tasks. Where any submitted assessment task is considered to be unsatisfactory in this regard, the highest possible final grade that can be awarded for the unit will be 45.

Grade	Descriptor
HD (High Distinction)	Provides consistent evidence of deep and critical understanding in relation to the learning outcomes. There is substantial originality and insight in identifying, generating and communicating competing arguments, perspectives or problem-solving approaches; critical evaluation of problems, their solutions and their implications; creativity in application as appropriate to the discipline.
D (Distinction)	Provides evidence of integration and evaluation of critical ideas, principles and theories, distinctive insight and ability in applying relevant skills and concepts in relation to learning outcomes. There is demonstration of frequent originality in defining and analysing issues or problems and providing solutions; and the use of means of communication appropriate to the discipline and the audience.
Cr (Credit)	Provides evidence of learning that goes beyond replication of content knowledge or skills relevant to the learning outcomes. There is demonstration of substantial understanding of fundamental concepts in the field of study and the ability to apply these concepts in a variety of contexts; convincing argumentation with appropriate coherent justification; communication of ideas fluently and clearly in terms of the conventions of the discipline.
P (Pass)	Provides sufficient evidence of the achievement of learning outcomes. There is demonstration of understanding and application of fundamental concepts of the field of study; routine argumentation with acceptable justification; communication of information and ideas adequately in terms of the conventions of the discipline. The learning attainment is considered satisfactory or adequate or competent or capable in relation to the specified outcomes
F (Fail)	Does not provide evidence of attainment of learning outcomes. There is missing or partial or superficial or faulty understanding and application of the fundamental concepts in the field of study; missing, undeveloped, inappropriate or confusing argumentation; incomplete, confusing or lacking communication of ideas in ways that give little attention to the conventions of the discipline.

Note: If you fail a unit with a professional experience component, the fail grade will be on your transcript irrespective of the timing of the placement.

### Withdrawing from this unit

If you are considering withdrawing from this unit, please seek academic advice via <https://ask.mq.edu.au> before doing so as this unit may be a co-requisite or prerequisite for units in the following sessions and may impact your course progression.

## Results

Results shown in iLearn, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit [ask.mq.edu.au](#).

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#">Tutorial participation</a>	10%	No	All weekly tutorials and OCDs
<a href="#">Practical scientific investigations of Science and Technology syllabus concepts</a>	40%	No	23:55 11/09/2023
<a href="#">ASSET survey</a>	5%	No	23:55 06/10/2023
<a href="#">Portfolio for teaching mathematics</a>	45%	No	23:55 30/10/2023

### Tutorial participation

Assessment Type <sup>1</sup>: Participatory task

Indicative Time on Task <sup>2</sup>: 0 hours

Due: **All weekly tutorials and OCDs**

Weighting: **10%**

Each tutorial will have a compulsory participation task students will complete in class.

On successful completion you will be able to:

- Interpret and explain key concepts/principles/approaches/developmental progressions in NSW syllabuses for mathematics, science and technology.
- Critically reflect upon the efficacy of learning resources and approaches to develop mathematical, scientific and technological skills and concepts.
- Develop understanding of the requirements of a Graduate Teacher.

### Practical scientific investigations of Science and Technology syllabus concepts

Assessment Type <sup>1</sup>: Practice-based task

Indicative Time on Task <sup>2</sup>: 27 hours

Due: **23:55 11/09/2023**

Weighting: **40%**

Students will participate in, and present hands-on activities related to developing learners' conceptual understandings in science and technology. They will submit 4 videos/PPTs with one identified as the major assessment. The major assessment will be explained in detail.

On successful completion you will be able to:

- Explain the current research foundations of the mathematical, scientific, design and computational thinking of students.
- Articulate pedagogical principles for developing students' mathematical, scientific and computational thinking skills with reference to educational research and practice.
- Interpret and explain key concepts/principles/approaches/developmental progressions in NSW syllabuses for mathematics, science and technology.
- Critically reflect upon the efficacy of learning resources and approaches to develop mathematical, scientific and technological skills and concepts.

## ASSET survey

Assessment Type <sup>1</sup>: Participatory task

Indicative Time on Task <sup>2</sup>: 3 hours

Due: **23:55 06/10/2023**

Weighting: **5%**

Completing the Annual Student Survey of Education for Teaching (ASSET) forms part of the assessment for this unit. The survey is in 5 parts and students will be awarded 1% for completion of each part.

On successful completion you will be able to:

- Develop understanding of the requirements of a Graduate Teacher.

## Portfolio for teaching mathematics

Assessment Type <sup>1</sup>: Portfolio

Indicative Time on Task <sup>2</sup>: 30 hours

Due: **23:55 30/10/2023**

Weighting: **45%**

1. Prepare a portfolio about how students effectively learn the concepts and processes in the NSW Mathematics K-6 syllabus by drawing upon mathematics education research and theory. The explanation must include:

- key concepts from the syllabus and
- a research-based argument for why particular pedagogical approaches and Working Mathematically processes are highlighted.

2. Create a multimedia presentation for a parent audience that evaluates the most effective ways for students from diverse contexts to learn concepts and processes in the NSW Mathematics K-6 syllabus. Provide substantiating examples of evidence-based practice drawn from research.

On successful completion you will be able to:

- Explain the current research foundations of the mathematical, scientific, design and computational thinking of students.
- Articulate pedagogical principles for developing students' mathematical, scientific and computational thinking skills with reference to educational research and practice.
- Interpret and explain key concepts/principles/approaches/developmental progressions in NSW syllabuses for mathematics, science and technology.
- Critically reflect upon the efficacy of learning resources and approaches to develop mathematical, scientific and technological skills and concepts.

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<sup>1</sup> If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the [Writing Centre](#) for academic skills support.

<sup>2</sup> Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

## Delivery and Resources

### Required and recommended texts

Skamp, K. & Preston, C. (Eds.) (2021). *Teaching primary science constructively* (7th ed.). Cengage Learning.

Forbes, A. (2023). *Primary science education: A teacher's toolkit*. Cambridge University Press. ISBN 978-1-009-26105-0

Reys, R., Lindquist, M., Lambdin, D., Smith, N., Rogers, A., Cooke, A., Bennett, S., Ewing, B., & West, J. (2022). *Helping children learn mathematics* (4th Australian Edition). Wiley.



### Information about the unit iLearn site

This unit has a full web presence through iLearn.

Students will need regular access to a computer and the Internet to complete this unit.

Weekly access to iLearn is compulsory for all students. Important assessment information will be posted here, as will other relevant unit notices and materials, including a reading template and guide to lecture note taking to assist your studies.

Various activities and materials for discussion and critical reflection are included and students enrolled in INFQ mode are especially encouraged to use this web component. Electronic links and suggested references will be included in the Resources section. Please check the iLearn unit regularly.

Weekly lectures are available on the web through the ECHO360 lecture component. You must listen to all lectures.

PowerPoint slides are available in iLearn in advance of the weekly lecture and/or are available in the Active Learning Tool.

### Access and technical assistance

Information for students about access to the online component of this unit is available at <https://ilearn.mq.edu.au/login/index.php>. You will need to enter your student username and password.

Please do NOT contact the Unit Convenor regarding iLearn technical help.

Assistance is available from IT Helpdesk

Ph: 9850 4357 or 1800 67 4357

Log a request: [help.mq.edu.au](https://help.mq.edu.au).

On Campus: Ground floor at 18 Wally's Walk

### Structure

The unit structure can be found in the university timetable <https://timetables.mq.edu.au/2023/>

Note that this year, for the first time, **10% of the overall assessment for the unit is related to tutorial participation, which is determined through your attendance, and your active participation and engagement with in-class and preparatory activities. Preparatory activities include: watching lectures, undertaking required readings, conducting scientific investigations at home and engaging with iLearn content.**

Participation will be assessed by tutors on a weekly basis (or through attendance at the two On Campus Days) and will be based on your:

\* visible presence,

\* behaviour and interactions in class, and

\* evidence that you have conducted required preparatory activities.

*If you miss a tutorial then you need to do one of the following:*

1. use iLearn dialogue to communicate with the relevant Unit Convenor to ask if you can attend another tutorial for that week only (this will be subject to limits on numbers in tutorial rooms and needs to be for serious and unavoidable reasons only - permission to attend another class cannot be guaranteed), or
2. submit a Special Consideration request <https://students.mq.edu.au/study/assessment-exams/special-consideration> that your attendance is waived (you need to provide appropriate and compelling evidence that this is warranted).

*If you miss an On Campus Day you need to:*

- submit a Special Consideration request <https://students.mq.edu.au/study/assessment-exams/special-consideration> that your attendance is waived (you need to provide appropriate and compelling evidence that this is warranted).

The **weekly program** for the course with the accompanying readings/ preparation is available on the unit iLearn site.

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

Students seeking more policy resources can visit [Student Policies \(https://students.mq.edu.au/support/study/policies\)](https://students.mq.edu.au/support/study/policies). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au)

[du.au](#)) and use the [search tool](#).

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/student-conduct>

## Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit [ask.mq.edu.au](http://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

## Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

## The Writing Centre

[The Writing Centre](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

## Student Services and Support

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)

- [Accessibility and disability support](#) with study
- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support including information about finances, tenancy and legal issues](#)
- [Student Advocacy](#) provides independent advice on MQ policies, procedures, and processes

## Student Enquiries

Got a question? Ask us via [AskMQ](#), or contact [Service Connect](#).

## IT Help

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/).

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

## School of Education Procedures

In addition, the following policies and procedures of the School of Education are applicable in this unit.

### Attendance for undergraduate units

See the university timetable for information about when classes begin in this unit. <https://timetables.mq.edu.au/2023/>

Activities completed during weekly tutorials (internal/DAY mode) or on campus days (external/INFQ mode) are essential for building the core knowledge and/or skills required to demonstrate the learning outcomes of this unit [and to meet the AITSL Graduate Teacher Standards and/or ACECQA requirements]. Attendance at all tutorials or on campus days is expected and the roll will be taken. This unit carries a 10% assessment mark for participation, which is described in detail in the Delivery and Resources section above.

*Students are required to attend the tutorial in which they are enrolled. Any changes to tutorial enrolments must be completed officially through e-student. Please do not contact the unit convenor requesting a change.*

### Electronic Communication

It is the student's responsibility to check all electronic communication on a regular weekly basis. Communication may occur via:

- Official MQ Student Email Address

- The Dialogue function on iLearn
- Other iLearn communication functions

### **Infrequent Attendance Students**

Information about the dates of the on-campus sessions can be found in the university timetable.

<https://timetables.mq.edu.au/2023/>

- The on-campus sessions are essential to student engagement and learning and attendance on all days is expected. Failure to attend or to have an approved Special Consideration may result in a Fail grade for the unit. Please see attendance requirements in this unit guide.
- Prior to the on-campus sessions, you should have read the prescribed readings and listened to the lectures. Summarise the main points and make a note of the key terms and definitions. Prepare any discussion questions of your own that you wish to share.
- Please make effective use of the online component of the unit and access iLearn regularly. Keep up to date with listening to the lectures on a weekly basis.
- Further specific details and any updates about times and locations will be posted on iLearn as an Announcement during first half of the semester.

### **Fail Rule**

General Coursework Rule 17 stipulates that where a student is enrolled in a practical, clinical or Professional course with fitness to practice requirements:

- if a student fails one practical, clinical or professional activity they may be permanently excluded from that course; or
- if a student fails an essential unit twice or fails the equivalent of 20 credit points they may be permanently excluded from further enrolment in that course.

Students completing a double degree will be able to continue with their other degree program provided they meet the academic progression requirements of the Academic Progression Policy.

Students completing a single Education degree (such as the BTeach/MTeach) are advised to seek academic advice.

## **Changes from Previous Offering**

This unit now carries a 10% assessment mark for participation, which is described in detail in the Delivery and Resources section above.

## **5Rs framework**

The 5Rs Framework, developed by the School of Education at Macquarie University, is

embedded throughout your teacher education course.

Your use of the 5Rs Framework will help you develop the capabilities that will make your teaching career sustainable and fulfilling.

In this unit, you will learn using the 5Rs framework in the following important ways:

**Resilience:** engaging strongly with intellectually challenging content relevant to teaching mathematics and science

**Reflexive:** development and focus on critical thinking skills that develop professional discernment when teaching mathematics and science

**Research-engaged:** use research to discuss and justify approaches to teaching and learning science and mathematics

## Changes since First Published

Date	Description
16/08/2023	I've added the names of 2 new Maths tutors
19/07/2023	I added Convenor/Lecturer to my status