



ECHE234

Teaching and Learning Mathematics, Science and Technology 2

S2 External 2017

Department of Educational Studies

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General Information

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Credit points
3

Prerequisites
ECH232

Corequisites

Co-badged status

Unit description

This unit has a particular focus on the Statistics and Probability, Measurement and Geometry and Number strategies for K-6 students. The unit also addresses the strands of made environments and natural environments and focuses on the sub strands physical world, material world, built environments, products, information and material world. Here the importance of environmental education and sustainability for the future is also addressed, as well as effective technology integration. The unit builds on knowledge gained in ECH232 and continues to develop students' understanding of the processes of learning, teaching and assessing mathematics, science and technology. This unit is the second in a series of core units across these KLAs.

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:

1. Continue to develop an understanding of the major theoretical developments in early childhood mathematics, science and digital technologies education.
2. Continue to develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NESA syllabuses and other curriculum requirements of the Education Act.
3. Continue to develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NESA syllabuses and other curriculum requirements of the Education Act.
4. Demonstrate knowledge of mathematical concepts and processes in the area of patterns & algebra, number and space & geometry.
5. Demonstrate knowledge of scientific concepts and processes related to the natural environment in the contexts of living things.
6. Develop an ethical stance on environmental education and assume responsibility for influencing the direction of early childhood practice in order to ensure sustainability for the future.
7. Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics, science & digital technologies.
8. Develop skills in integrating information and communication technologies (ICT) within effective teaching and learning strategies to expand opportunities for students in mathematics and science learning.

Assessment Tasks

Name	Weighting	Hurdle	Due
AT1: Planning for Maths	35%	No	15th September, 2017 by 5pm
AT2: Online Quiz	10%	No	15th October, 2017 at midnight
AT3: Science Learning Unit	55%	No	13th November, midnight

AT1: Planning for Maths

Due: **15th September, 2017 by 5pm**

Weighting: **35%**

Brief Overview:

This assessment requires students to select a quality children's book with potential to enhance mathematics learning in Stage 2 or 3. Students then develop a mini-unit of work (presented as a booklet) of mathematics lessons. You may commence the assignment but **PLEASE** wait to complete the first two tutorials with Maths before completing the task. **This will be in Week 6. The assignment is due at the end of Week 7.**

On successful completion you will be able to:

- 1. Continue to develop an understanding of the major theoretical developments in early childhood mathematics, science and digital technologies education.
- 2. Continue to develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NESA syllabuses and other curriculum requirements of the Education Act.
- 3. Continue to develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NESA syllabuses and other curriculum requirements of the Education Act.
- 4. Demonstrate knowledge of mathematical concepts and processes in the area of patterns & algebra, number and space & geometry.
- 7. Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics, science & digital technologies.
- 8. Develop skills in integrating information and communication technologies (ICT) within effective teaching and learning strategies to expand opportunities for students in mathematics and science learning.

AT2: Online Quiz

Due: **15th October, 2017 at midnight**

Weighting: **10%**

Brief Overview:

- This task requires you to reflect on the lectures, tutorials and readings provided each week in ECHE234 and respond to the online task on all 3 KLAs (Science, Mathematics and Digital Technologies) including and up to the end of Week 6
- A 20 question multiple choice quiz with a 30 minute limit
- The quiz will be available from 11th September, 2017 at 9am and closes 14th October, 2017 at midnight
- It is an open book task
- You should only commence this quiz when you have appropriate, uninterrupted time to complete this task. There is NO option to re-set or re-start your quiz.
- **Submission:** This quiz will be offered online via iLearn

On successful completion you will be able to:

- 1. Continue to develop an understanding of the major theoretical developments in early childhood mathematics, science and digital technologies education.
- 4. Demonstrate knowledge of mathematical concepts and processes in the area of patterns & algebra, number and space & geometry.
- 5. Demonstrate knowledge of scientific concepts and processes related to the natural environment in the contexts of living things.
- 8. Develop skills in integrating information and communication technologies (ICT) within effective teaching and learning strategies to expand opportunities for students in mathematics and science learning.

AT3: Science Learning Unit

Due: **13th November, midnight**

Weighting: **55%**

Brief Overview:

This assessment evaluates pre-service teachers' capabilities to critically review, select, plan for and utilise a small array of apps to support school students as they develop, represent and communicate/share their understandings of a science concept. The *Science Learning Unit* must

focus on engaging students in online and offline activities connected with the skill outcomes of Working Scientifically and Working Technologically, and the knowledge and understanding outcomes of **Physical World** and **Material World** from the NSW K-6 Science & Technology syllabus

On successful completion you will be able to:

- 1. Continue to develop an understanding of the major theoretical developments in early childhood mathematics, science and digital technologies education.
- 2. Continue to develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NESA syllabuses and other curriculum requirements of the Education Act.
- 3. Continue to develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NESA syllabuses and other curriculum requirements of the Education Act.
- 5. Demonstrate knowledge of scientific concepts and processes related to the natural environment in the contexts of living things.
- 6. Develop an ethical stance on environmental education and assume responsibility for influencing the direction of early childhood practice in order to ensure sustainability for the future.
- 7. Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics, science & digital technologies.
- 8. Develop skills in integrating information and communication technologies (ICT) within effective teaching and learning strategies to expand opportunities for students in mathematics and science learning.

Delivery and Resources

OVERVIEW:

The external mode of delivery will be in 3 week blocks. Each block will consist of an online lecture (one for each KLA), allocated tasks (see each KLA folder) and face-to-face tutorials to be conducted On Campus Days (OCD). The lecture or collection of shorter lectures (not totalling more than one hour) will be available online via iLearn. Please refer to EACH topic description for the location. We are trialling a variety of methods including ECHO360, YouTube and imbedded within each KLA folder. Following this, Pre-Service Teachers will attend and actively participate in 2 On Campus Days.

There will be three assignments in this unit. ***Students must present all tasks to be considered for a passing grade in this unit.***

Resources: There is no set text for this unit. Each block will have its own set of readings which can be sourced from the library through the Multi-search option and are listed in the Unit Outline.

Policies and Procedures

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

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

Assessment Policy http://mq.edu.au/policy/docs/assessment/policy_2016.html

Grade Appeal Policy <http://mq.edu.au/policy/docs/gradeappeal/policy.html>

Complaint Management Procedure for Students and Members of the Public http://www.mq.edu.au/policy/docs/complaint_management/procedure.html

Disruption to Studies Policy (in effect until Dec 4th, 2017): http://www.mq.edu.au/policy/docs/disruption_studies/policy.html

Special Consideration Policy (in effect from Dec 4th, 2017): <https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policies/special-consideration>

In addition, a number of other policies can be found in the [Learning and Teaching Category](#) of Policy Central.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/support/student_conduct/

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.

Student Support

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

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

Student Services and Support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide

appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

IT Help

For help with University computer systems and technology, visit 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.

Graduate Capabilities

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Learning outcomes

- 2. Continue to develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NESA syllabuses and other curriculum requirements of the Education Act.
- 3. Continue to develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NESA syllabuses and other curriculum requirements of the Education Act.
- 4. Demonstrate knowledge of mathematical concepts and processes in the area of patterns & algebra, number and space & geometry.
- 8. Develop skills in integrating information and communication technologies (ICT) within effective teaching and learning strategies to expand opportunities for students in mathematics and science learning.

Assessment tasks

- AT1: Planning for Maths
- AT3: Science Learning Unit

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to

handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

Assessment tasks

- AT1: Planning for Maths
- AT2: Online Quiz
- AT3: Science Learning Unit

Commitment to Continuous Learning

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

Learning outcome

- 8. Develop skills in integrating information and communication technologies (ICT) within effective teaching and learning strategies to expand opportunities for students in mathematics and science learning.

Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- 1. Continue to develop an understanding of the major theoretical developments in early childhood mathematics, science and digital technologies education.
- 2. Continue to develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NESA syllabuses and other curriculum requirements of the Education Act.
- 3. Continue to develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NESA syllabuses and

other curriculum requirements of the Education Act.

- 4. Demonstrate knowledge of mathematical concepts and processes in the area of patterns & algebra, number and space & geometry.
- 5. Demonstrate knowledge of scientific concepts and processes related to the natural environment in the contexts of living things.
- 8. Develop skills in integrating information and communication technologies (ICT) within effective teaching and learning strategies to expand opportunities for students in mathematics and science learning.

Assessment tasks

- AT1: Planning for Maths
- AT2: Online Quiz
- AT3: Science Learning Unit

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- 2. Continue to develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NESA syllabuses and other curriculum requirements of the Education Act.
- 3. Continue to develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NESA syllabuses and other curriculum requirements of the Education Act.
- 7. Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics, science & digital technologies.

Assessment tasks

- AT1: Planning for Maths
- AT2: Online Quiz
- AT3: Science Learning Unit

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcomes

- 5. Demonstrate knowledge of scientific concepts and processes related to the natural environment in the contexts of living things.
- 6. Develop an ethical stance on environmental education and assume responsibility for influencing the direction of early childhood practice in order to ensure sustainability for the future.
- 7. Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics, science & digital technologies.

Assessment tasks

- AT1: Planning for Maths
- AT2: Online Quiz
- AT3: Science Learning Unit

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcomes

- 4. Demonstrate knowledge of mathematical concepts and processes in the area of patterns & algebra, number and space & geometry.
- 8. Develop skills in integrating information and communication technologies (ICT) within effective teaching and learning strategies to expand opportunities for students in mathematics and science learning.

Assessment tasks

- AT1: Planning for Maths

- AT3: Science Learning Unit

Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

Learning outcome

- 6. Develop an ethical stance on environmental education and assume responsibility for influencing the direction of early childhood practice in order to ensure sustainability for the future.

Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

Learning outcome

- 6. Develop an ethical stance on environmental education and assume responsibility for influencing the direction of early childhood practice in order to ensure sustainability for the future.