



ECHE234

Teaching and Learning Mathematics, Science and Technology 2

S2 External 2016

Institute of Early Childhood

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General Information

Unit convenor and teaching staff

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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:

Continue to develop an understanding of the major theoretical developments in early childhood mathematics, science and technology education.

Continue to develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NSW syllabuses and other curriculum requirements of the Education Act.

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.

Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology.

Continue to develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NSW syllabuses and other curriculum requirements of the Education Act.

Demonstrate knowledge of mathematical concepts and processes in the area of patterns & algebra and space & geometry.

Demonstrate knowledge of scientific concepts and processes related to the natural environment in the contexts of living things.

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.

Assessment Tasks

| Name | Weighting | Due |
|---|-----------|-------------------|
| <u>Weekly Quizzes and Online task</u> | 30% | Weekly |
| <u>Planning for Science Learning</u> | 35% | Sept 20 or Nov 10 |
| <u>Maths across the curriculum</u> | 35% | Sept 20 or Nov 10 |

Weekly Quizzes and Online task

Due: **Weekly**

Weighting: **30%**

Each week students complete a timed online quiz (of up to 5 questions) in response to the learning module. Over semester a random selection of 6 quizzes are marked and included in the grade for this task.

Further details and criteria for this assessment are available on iLearn.

On successful completion you will be able to:

- Continue to develop an understanding of the major theoretical developments in early childhood mathematics, science and technology education.
- 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.
- Demonstrate research-based knowledge of the models of pedagogy for teaching and

assessing mathematics and science & technology.

- Demonstrate knowledge of mathematical concepts and processes in the area of patterns & algebra and space & geometry.
- Demonstrate knowledge of scientific concepts and processes related to the natural environment in the contexts of living things.

Planning for Science Learning

Due: **Sept 20 or Nov 10**

Weighting: **35%**

This assessment requires the student to develop a mini unit of work for science learning using interactive technologies such as SMART notebook or PROwise software. This task can only be submitted after students have completed the first ICT topic and the Science module - so due date varies depending on the students schedule of modules.

Further details and criteria for this assessment are available on iLearn.

On successful completion you will be able to:

- Continue to develop an understanding of the major theoretical developments in early childhood mathematics, science and technology education.
- Continue to develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NSW syllabuses and other curriculum requirements of the Education Act.
- 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.
- Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology.
- Continue to develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NSW syllabuses and other curriculum requirements of the Education Act.
- Demonstrate knowledge of scientific concepts and processes related to the natural environment in the contexts of living things.
- 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.

Maths across the curriculum

Due: **Sept 20 or Nov 10**

Weighting: **35%**

This assessment requires students to select a 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. This task can only be completed after students have completed the mathematics modules -so due date varies depending on the students schedule of modules.

Further details and criteria for this assessment are available on iLearn.

On successful completion you will be able to:

- Continue to develop an understanding of the major theoretical developments in early childhood mathematics, science and technology education.
- Continue to develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NSW syllabuses and other curriculum requirements of the Education Act.
- Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology.
- Continue to develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NSW syllabuses and other curriculum requirements of the Education Act.
- Demonstrate knowledge of mathematical concepts and processes in the area of patterns & algebra and space & geometry.

Delivery and Resources

ECHE234 integrates in-class learning tasks (or external equivalent), online activities, and independent work. Within ECHE234 students complete a series of three modules in Mathematics, Science and Technology. At the end of their modules (in the final week of semester) students share their work with peers in class or online.

Classes

Students within ECHE234 are required to attend classes as outlined by the unit schedule on iLearn. It should be noted that classes rotate through modules and so careful attention should be paid to the module schedule. Completion of all modules (internal classes or external equivalent) and online tasks is needed to successfully pass this unit. The timetable for internal classes can be found on the University web site at: <https://timetables.mq.edu.au/2016/> .

External students will attend 2 compulsory on campus days on the 10th September and 15th October.

Resources

This unit requires students to access online journals and research materials through the Macquarie University Library website. There are no set texts for this unit. Weekly readings are available via iLearn.

Unit Schedule

| | | | |
|---|--|--|--|
| Week Beginning | <u>External Students</u> | | |
| | <p>Tutorial Group A (Tuesday 9am starting in X5B041)</p> <p>Tutorial Group D (Tuesday 11am starting in X5B041)</p> | <p>Tutorial Group B (Tuesday 9am starting in X5B045)</p> <p>Tutorial Group E (Tuesday 11am starting in X5B045)</p> | <p>Tutorial Group C (Tuesday 9am starting in X5B025)</p> <p>Tutorial Group F (Tuesday 11am starting in X5B251)</p> |
| Week 1 August 1st | Introduction (All) & Maths Topic 1 | Introduction (All) & Science Topic 1 | Introduction (All) & ICT Topic 1 |
| Week 2 August 8th | Maths Topic 2 | Science Topic 2 | ICT Topic 2 |
| Week 3 August 15th | Maths Topic 3 | Science Topic 3 | ICT Topic 3 |
| Week 4 August 22nd | ICT Topic 1 | Maths Topic 1 | Science Topic 1 |
| Week 5 August 29th | ICT Topic 2 | Maths Topic 2 | Science Topic 2 |
| Compulsory external on campus day 1 Saturday 10th September 9-5 (Maths, 1, 2 & 3 & ICT 1/2) | | | |
| Week 6 September 5th | ICT Topic 3 | Maths Topic 3 | Science Topic 3 |
| Week 7 September 12th | Science Topic 1 | ICT Topic 1 | Maths Topic 1 |

| Mid Semester Break | | | |
|--|--|-------------|---------------|
| <u>Assessment 2 due 20th September</u> (External Students & Group A, B, D and E will submit the Mathematics Assessment. Groups C and F will submit the Science Assessment) | | | |
| Week 8 October 3rd | Science Topic 2 | ICT Topic 2 | Maths Topic 2 |
| Week 9 October 10th | Science Topic 3 | ICT Topic 3 | Maths Topic 3 |
| Compulsory external on campus day 1 Saturday 15th October 9-5 (Science, 1, 2 & 3 & ICT 2/3) | | | |
| Week 10 October 17th | ECHP223 Prac – no classes weeks 10, 11, 12 | | |
| Week 11 October 24th | | | |
| Week 12 October 31st | | | |
| Week 13 November 7th | <u>Assessment 3 due 10th November</u> (External Students & Group A, B, D and E will submit the Science Assessment. Groups C and F will submit the Mathematics Assessment) In class presentations - sharing with the science resource or the mathematics booklet with peers in small groups. | | |

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

New Assessment Policy in effect from Session 2 2016 http://mq.edu.au/policy/docs/assessment/policy_2016.html. For more information visit http://students.mq.edu.au/events/2016/07/19/new_assessment_policy_in_place_from_session_2/

Assessment Policy prior to Session 2 2016 <http://mq.edu.au/policy/docs/assessment/policy.html>

Grading Policy prior to Session 2 2016 <http://mq.edu.au/policy/docs/grading/policy.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 http://www.mq.edu.au/policy/docs/disruption_studies/policy.html *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

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

- Continue to develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NSW syllabuses and other curriculum requirements of the Education Act.
- 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.
- Continue to develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NSW syllabuses and other curriculum requirements of the Education Act.

Assessment tasks

- Weekly Quizzes and Online task
- Planning for Science Learning
- Maths across the curriculum

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:

Assessment tasks

- Weekly Quizzes and Online task
- Planning for 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

- Continue to develop an understanding of the major theoretical developments in early childhood mathematics, science and technology education.
- Continue to develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NSW syllabuses and other curriculum requirements of the Education Act.
- 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.
- Continue to develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NSW syllabuses and other curriculum requirements of the Education Act.
- Demonstrate knowledge of mathematical concepts and processes in the area of patterns & algebra and space & geometry.
- Demonstrate knowledge of scientific concepts and processes related to the natural environment in the contexts of living things.

Assessment tasks

- Weekly Quizzes and Online task
- Planning for Science Learning
- Maths across the curriculum

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

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

Assessment tasks

- Weekly Quizzes and Online task
- Planning for Science Learning
- Maths across the curriculum

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

- Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology.
- 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.

Assessment tasks

- Weekly Quizzes and Online task
- Planning for Science Learning
- Maths across the curriculum

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 outcome

- Demonstrate knowledge of mathematical concepts and processes in the area of patterns & algebra and space & geometry.

Assessment tasks

- Weekly Quizzes and Online task
- Planning for Science Learning
- Maths across the curriculum

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

- 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.

Assessment task

- Planning for Science Learning

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

- 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.

Assessment task

- Planning for Science Learning