



ECH 335

Young Children's 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

(39cp at 100 level or above) including (ECH232 or ECH215)

Corequisites

Co-badged status

Unit description

This unit builds on the knowledge gained in ECH232, exploring further the theory and practice of mathematics, science and technology for young children and children in K–6 classrooms. Students continue to gain an understanding of developmental stages in children's learning of mathematics and science. Teaching and assessment strategies relevant for planning and implementing developmental programs are examined including the integration of information and communication technologies.

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 technology 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. Demonstrate knowledge of mathematical concepts and processes in the area of patterns & algebra and space & geometry.
4. Demonstrate knowledge of scientific concepts and processes related to the natural environment in the contexts of living things.
5. 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.
6. Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology.
7. 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: Weekly online task	30%	No	Weekly Sunday midnight
AT2: Planning for Maths	35%	No	29th Sept by 5pm
AT3: Planning for Science	35%	No	13th November at 5pm

AT1: Weekly online task

Due: **Weekly Sunday midnight**

Weighting: **30%**

BRIEF DESCRIPTION:

Commencing in Week 2 there will be 9 weekly online quiz to accompany each of the modules have are accompanied by a short quiz. The quizzes are linked to the lectures and readings and are designed so you get some feedback over semester as you're studying. Each quiz will a range of questions. The quizzes are open book.

The types of questions vary but may include:

- multiple choice responses

- true / false questions
- short answer
- short (less than 250 word) reflections

PLEASE NOTE:

Given this 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.

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 technology education.
- 3. Demonstrate knowledge of mathematical concepts and processes in the area of patterns & algebra and space & geometry.
- 4. Demonstrate knowledge of scientific concepts and processes related to the natural environment in the contexts of living things.
- 6. Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology.

AT2: Planning for Maths

Due: **29th Sept by 5pm**

Weighting: **35%**

BRIEF OVERVIEW:

The purpose of the assignment is to design a resource folder containing 4 motivating mathematics experiences for children in prior to school and school settings. Each of these experiences must focus on the patterns and algebra strand, and at least one plan must integrate technology (eg an iPad app, webpage, kiosk, video etc) as ONE COMPONENT (but not all) of the lesson. Please do not complete the assignment until after the On Campus Days. **This will be in Week 8. The assignment is due on Friday 29th September no later than 5 pm (Week 9).**

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 technology 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. Demonstrate knowledge of mathematical concepts and processes in the area of patterns & algebra and space & geometry.
- 6. Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology.
- 7. 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: Planning for Science

Due: **13th November at 5pm**

Weighting: **35%**

BRIEF OVERVIEW:

In completing this assignment students will develop a plan for teaching sustainability OR environmental education in schools. It is anticipated that students will plan for a school class (K-6) that they are familiar with, such as their class group from professional experience. The assignment will be presented as a mini-unit and will be submitted via turnitin.

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 technology 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.
- 4. Demonstrate knowledge of scientific concepts and processes related to the natural environment in the contexts of living things.
- 5. 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.
- 6. Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology.
- 7. 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

ECH335 will be offered as an external unit in Semester 2, 2017.

ECH335 will engage students in a combination of face-to-face and online tasks. Students will complete a series of modules: an introductory a module then in Science (addressing the following topics Science 1; Science 2 and Science 3), Mathematics (addressing the following topics Mathematics 1, Mathematics2 and Mathematics3) and Technology (addressing the following topics ICT1, ICT2 and ICT3). Each module will consist an online lecture, assessable online tasks and face-to-face On Campus days. The lecture or collection of shorter lectures (not totalling more than one hour) will be available online as a video. It is assumed the students ill spend 9 hours on this unit each work on assigned tasks.

There will be two assignments and weekly assessable online tasks 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 module will have its own set of readings which can be sourced from the library 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. Demonstrate knowledge of mathematical concepts and processes in the area of patterns & algebra and space & geometry.

- 4. Demonstrate knowledge of scientific concepts and processes related to the natural environment in the contexts of living things.
- 6. Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology.
- 7. 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

- AT2: Planning for Maths
- AT3: Planning for Science

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:

Learning outcomes

- 3. Demonstrate knowledge of mathematical concepts and processes in the area of patterns & algebra and space & geometry.
- 4. Demonstrate knowledge of scientific concepts and processes related to the natural environment in the contexts of living things.
- 6. Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology.

Assessment tasks

- AT1: Weekly online task
- AT2: Planning for Maths
- AT3: Planning for Science

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

- 7. 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 task

- AT3: Planning for Science

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 technology 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. Demonstrate knowledge of mathematical concepts and processes in the area of patterns & algebra and space & geometry.
- 4. Demonstrate knowledge of scientific concepts and processes related to the natural environment in the contexts of living things.
- 5. 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.
- 6. Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology.

Assessment tasks

- AT1: Weekly online task
- AT2: Planning for Maths

- AT3: Planning for Science

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. Demonstrate knowledge of mathematical concepts and processes in the area of patterns & algebra and space & geometry.
- 4. Demonstrate knowledge of scientific concepts and processes related to the natural environment in the contexts of living things.
- 5. 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.
- 6. Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology.
- 7. 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: Weekly online task
- AT2: Planning for Maths
- AT3: Planning for Science

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

- 3. Demonstrate knowledge of mathematical concepts and processes in the area of patterns & algebra and space & geometry.
- 4. Demonstrate knowledge of scientific concepts and processes related to the natural environment in the contexts of living things.
- 6. Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology.
- 7. 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: Weekly online task
- AT2: Planning for Maths
- AT3: Planning for Science

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

- 3. Demonstrate knowledge of mathematical concepts and processes in the area of patterns & algebra and space & geometry.
- 4. Demonstrate knowledge of scientific concepts and processes related to the natural environment in the contexts of living things.
- 6. Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology.
- 7. 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

- AT2: Planning for Maths
- AT3: Planning for Science

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:

Assessment task

- AT3: Planning for Science

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 outcomes

- 4. Demonstrate knowledge of scientific concepts and processes related to the natural environment in the contexts of living things.
- 5. 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

- AT3: Planning for Science