



ECH 232

Teaching and Learning Mathematics, Science and Technology 1

S2 External 2015

Institute of Early Childhood

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General Information

Unit convenor and teaching staff

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Credit points

3

Prerequisites

ECH113 or (12cp and admission to BTeach(ECS))

Corequisites

Co-badged status

Unit description

This unit explores the theory and practice of mathematics, science and technology for young children. Mathematics, science and technology are presented as ways of acquiring and processing information about the world. Students gain an understanding of developmental stages in young children's learning of mathematics and science. Teaching and assessment strategies relevant for planning and implementing developmental programs are examined.

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:

Demonstrate a fundamental understanding of the major theoretical developments in early childhood mathematics, science and technology education;

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 relevant knowledge of the central concepts, modes of enquiry and structure in the discipline of mathematics and science & technology

Begin to evaluate mathematics, science and technology resources in light of their experience as a teacher of young children;

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

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;

Explore, adapt and shape understandings and skills and demonstrate safe, responsible and legal use of ICT in planning and teaching.

General Assessment Information

All assessments in this unit involved online tasks and online submission.

Assessment Tasks

Name	Weighting	Due
<u>Topic based quizzes</u>	30%	weekly
<u>Planning for Science</u>	35%	4th September, 2015
<u>Planning for Mathematics</u>	35%	9th November, 2015

Topic based quizzes

Due: **weekly**

Weighting: **30%**

For each topic students will complete a short quiz. 6 Quizzes are marked over semester to total 30% of the grade.

Details of the assessment tasks are available via the full unit outline on iLearn.

On successful completion you will be able to:

- Demonstrate a fundamental understanding of the major theoretical developments in

early childhood mathematics, science and technology education;

- Begin to evaluate mathematics, science and technology resources in light of their experience as a teacher of young children;
- Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology

Planning for Science

Due: **4th September, 2015**

Weighting: **35%**

Students will plan a mini-unit of work and design an information kiosk.

Details of the assessment tasks are available via the full unit outline on iLearn.

On successful completion you will be able to:

- Demonstrate a fundamental understanding of the major theoretical developments in early childhood mathematics, science and technology education;
- 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 relevant knowledge of the central concepts, modes of enquiry and structure in the discipline of mathematics and science & technology
- Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology
- 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;
- Explore, adapt and shape understandings and skills and demonstrate safe, responsible and legal use of ICT in planning and teaching.

Planning for Mathematics

Due: **9th November, 2015**

Weighting: **35%**

Students will design a collection of mathematics lessons and evaluate three technology resources.

Details of the assessment tasks are available via the full unit outline on iLearn.

On successful completion you will be able to:

- Demonstrate a fundamental understanding of the major theoretical developments in early childhood mathematics, science and technology education;
- 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 relevant knowledge of the central concepts, modes of enquiry and structure in the discipline of mathematics and science & technology
- Begin to evaluate mathematics, science and technology resources in light of their experience as a teacher of young children;
- Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology
- 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;
- Explore, adapt and shape understandings and skills and demonstrate safe, responsible and legal use of ICT in planning and teaching.

Delivery and Resources

CLASSES

ECH232 will engage students in a combination of face-to-face and online tasks. Students will complete a series of modules: including an introductory a module in each topic (addressing Science 1, ICT 1 and Maths 1), then modules in Science (addressing Science 2 and Science 3), Mathematics (addressing Mathematics 2 and Mathematics 3) and Technology (addressing ICT 2 and ICT 3). The sequence in which students complete these modules will depend on their tutorial time, with groups rotating between topic areas after three weeks.

Each module will consist an online lecture, assessable online tasks and face-to-face tutorials. The lecture or collection of shorter lectures (not totalling more than one hour) will be available online as a video. Following this, students will complete a 2 hour tutorial each week (or equivalent compulsory on campus days for external students).

The timetable for internal classes can be found on the University web site at: <http://www.timetable.es.mq.edu.au>

Completion of all modules is a requirement for satisfactory completion of the unit. Documentation (such as a doctor's certificate) should be provided to explain absences.

Compulsory On-Campus Session for ECH232 External Students

There are two compulsory On-Campus Sessions for ECH 232 external students. Failure to attend all or part of the sessions will result in automatic exclusion from the unit. The On-Campus sessions will be held on Saturday 22nd August and Wednesday 23rd September,

9.00am-4.00pm. Please make arrangements to attend for the full day each day. Further details will be sent out early in the semester.

IEC Electronic Communication

During semester time, staff may contact students using the following ways:

- *Dialogue* function on iLearn
- Official *MQ Student Email Address*

It is the student's responsibility to check all electronic communication on a regular weekly basis.

Withdrawing from this Unit

If you are considering withdrawing from this unit, please seek academic advice by writing to ie.c@mq.edu.au before doing so as this unit may be a co-requisite or prerequisite for units in the following semesters and may impact on your progression through the degree.

Unit Schedule

Week (week beginning)	Tutorial Group A (Wednesday 9am starting in X5B041)	Tutorial Group B (Wednesday 9am starting in X5B045)	Tutorial Group C (Wednesday 9am starting in X5B251)
	Tutorial Group D (Wednesday 11am starting in X5B041)	Tutorial Group E (Wednesday 11am starting in X5B045)	Tutorial Group F (Wednesday 11am starting in X5B251)
	Tutorial Group G (Wednesday 2pm starting in X5B041)	Tutorial Group H (Wednesday 2pm starting in X5B045)	Tutorial Group I (Wednesday 2pm starting in X5B251)
		External students	
1	27/7/13	Introduction to the unit (online content only). NO TUTORIAL CLASSES	
2	3/8/13	Mathematics Topic 1 (Jane X5B041)	Science Topic 1 (Camilla X5B045)
			Technology topic 1 (Maria X5B251)
3	10/8/13	Technology topic 1 (Maria X5B251)	Mathematics Topic 1 (Jane X5B041)
			Science Topic 1 (Camilla X5B045)
4	17/8/15	Science Topic 1 (Camilla X5B045)	Technology topic 1 (Maria X5B251)
			Mathematics Topic 1 (Jane X5B041)
		On Campus Day for Externals 22/8/15 (Science and ICT)	
5	24/8/15	Planning (ONLINE CONTENT ONLY)	
6	31/8/15	Study week. Assignment 2 (planning for science) due	
7	7/9/15	Science Topic2 (Camilla X5B045)	Mathematics Topic2 (Jane X5B041)
			Technology topic2 (Maria X5B251)

	14/9/15	midsemester break		
	21/9/15	On Campus Day for Externals 23/9/15 (Maths and ICT)		
8	28/9/15	Planning (ONLINE CONTENT ONLY)		
9	5/10/15	Science Topic3(PennyX5B045)	Mathematics Topic3(Jane X5B041)	Technology topic3(Maria X5B251)
10	12/10/15	Technology topic2(Maria X5B251)	Science Topic2(Camilla X5B045)	Mathematics Topic2(Jane X5B041)
11	19/10/15	Technology topic3(Maria X5B251)	Science Topic3(PennyX5B045)	Mathematics Topic3(Jane X5B041)
12	26/10/15	Mathematics Topic2(Jane X5B041)	Technology topic2(Maria X5B251)	Science Topic2(Camilla X5B045)
13	2/11/15	Mathematics Topic3(Jane X5B041)	Technology topic3(Maria X5B251)	Science Topic3(PennyX5B045)
		Assignment 3 (planning for maths) due		

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.html>

Grading Policy <http://mq.edu.au/policy/docs/grading/policy.html>

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

Grievance Management Policy http://mq.edu.au/policy/docs/grievance_management/policy.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://informatics.mq.edu.au/help/>.

When using the University's IT, you must adhere to the [Acceptable Use 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

- 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;

Assessment tasks

- Planning for Science
- Planning for Mathematics

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

- Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology
- Explore, adapt and shape understandings and skills and demonstrate safe, responsible and legal use of ICT in planning and teaching.

Assessment tasks

- Topic based quizzes
- Planning for Science
- Planning for Mathematics

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 outcomes

- 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;
- Explore, adapt and shape understandings and skills and demonstrate safe, responsible and legal use of ICT in planning and teaching.

Assessment tasks

- Planning for Science
- Planning for Mathematics

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

- Demonstrate a fundamental understanding of the major theoretical developments in early childhood mathematics, science and technology education;
- 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 relevant knowledge of the central concepts, modes of enquiry and structure in the discipline of mathematics and science & technology
- Begin to evaluate mathematics, science and technology resources in light of their experience as a teacher of young children;
- Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology

Assessment tasks

- Topic based quizzes
- Planning for Science
- Planning for Mathematics

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

- 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;
- Begin to evaluate mathematics, science and technology resources in light of their experience as a teacher of young children;
- 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;
- Explore, adapt and shape understandings and skills and demonstrate safe, responsible and legal use of ICT in planning and teaching.

Assessment tasks

- Topic based quizzes
- Planning for Science
- Planning for Mathematics

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 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

- Topic based quizzes
- Planning for Science
- Planning for Mathematics

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

- 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 relevant knowledge of the central concepts, modes of enquiry and structure in the discipline of mathematics and science & technology
- Begin to evaluate mathematics, science and technology resources in light of their experience as a teacher of young children;
- 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

- Topic based quizzes
- Planning for Science
- Planning for Mathematics

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

- Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology
- Explore, adapt and shape understandings and skills and demonstrate safe, responsible and legal use of ICT in planning and teaching.

Assessment tasks

- Topic based quizzes
- Planning for Science
- Planning for Mathematics

Changes from Previous Offering

In this unit there are several changes:

- assessment tasks have been modified slightly
- weekly schedule adapted
- textbook changed.