



# ECH 232

## Teaching and Learning Mathematics, Science and Technology 1

S1 External 2016

*Institute of Early Childhood*

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## General Information

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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
<a href="#">Observation and Planning</a>	35%	30/3/2016

Name	Weighting	Due
<a href="#">Planning for Science</a>	35%	22/5/2016
<a href="#">Quiz</a>	30%	10/6/2016

## Observation and Planning

Due: **30/3/2016**

Weighting: **35%**

Students will watch a video (in iLearn) of a child being assessed in maths. Students will reflect on this kind of assessment, design and propose follow up experiences to support children's mathematical learning.

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: **22/5/2016**

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.

## Quiz

Due: **10/6/2016**

Weighting: **30%**

Students will reply to 30 multiple choice questions covering the three modules (Maths, Science, Technology). Each week, depending on the module they have to do, students will have a short online quiz (5 multiple choice questions - unmarked) to help them practice before the large quiz at the end of the session.

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, online tasks, readings 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.timetables.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](mailto: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**

Tutorial day = <b>MONDAY</b>		<b>Tutorial Group A</b> 9 am X5B041  <b>Tutorial Group D</b> 11 am X5B041  <b>Tutorial Group G</b> 2 pm X5B041	<b>Tutorial Group B</b> 9 am X5B045  <b>Tutorial Group E</b> 11 am X5B045  <b>Tutorial Group H</b> 2 pm X5B045	<b>Tutorial Group C</b> 9 am X5B039  <b>Tutorial Group F</b> 11 am X5B251  <b>Tutorial Group I</b> 2 pm X5B251
<b>WEEK - DATE</b>		<b>External students (follow this column - vertically).</b>		
1	<b>29/2</b>	Mathematics 1 (X5B 041)	Science 1 (X5B 045)	Technology 1 (X5B 039/251)
2	<b>7/3</b>	Technology 1 (X5B 039/251)	Mathematics 1 (X5B 041)	Science 1 (X5B 045)
3	<b>14/3</b>	Science 1 (X5B 045)	Technology 1 (X5B 039/251)	Mathematics 1 (X5B 041)
	<b>19/3</b>	<b>FIRST On Campus Day</b>		
4	<b>21/3</b>	Mathematics 2 (X5B 041)	Science 2 (X5B 045)	Technology 2 (X5B 039/251)
5	<b>28/3</b>	EASTER MONDAY – NO CLASSES		
<b>Wednesday</b> <b>30/3 Assignment 1</b>		<b>Observation, Assessment and Planning for mathematics learning</b>		
6	<b>4/4</b>	Technology 2 (X5B 039/251)	Mathematics 2 (X5B 041)	Science 2 (X5B 045)
<b>MID SESSION BREAK</b> (11/4/ - 22/4) <b>14/4: SECOND ON CAMPUS DAY</b>				
7	<b>25/4</b>	PRAC – NO CLASSES		
8	<b>2/5</b>	PRAC – NO CLASSES		
9	<b>9/5</b>	PRAC – NO CLASSES		

10	16/5	Science 2 (X5B 045)	Technology 2 (X5B 039/251)	Mathematics 2 (X5B041)
<b>Sunday 22/5 Assignment 2</b>		<b>Planning for science and technology learning</b>		
11	23/5	Mathematics 3 (X5B 041)	Science 3 (X5B 045)	Technology 3 (X5B 039/251)
12	30/5	Technology 3 (X5B 039/251)	Mathematics 3 (X5B041)	Science 3 (X5B 045)
13	6/6	Science 3 (X5B 045)	Technology 3 (X5B 039/251)	Mathematics 3 (X5B 041)
<b>Friday 10/6 : Assignment 3: Quiz: Maths, Science and Technology</b>				

## 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](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](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/](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](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](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/](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](http://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](http://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/](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

- 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
- Quiz

## 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

- Observation and Planning
- Planning for Science
- Quiz

## 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
- Quiz

## 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

- Observation and Planning
- Planning for Science
- Quiz

## 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

- Observation and Planning
- Planning for Science
- Quiz

## 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

- Observation and Planning
- Planning for Science
- Quiz

## 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

- Observation and Planning
- Planning for Science
- Quiz

## 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**

- Observation and Planning
- Planning for Science
- Quiz

## **Changes from Previous Offering**

In this unit there are several changes:

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