# ECH 335
Young Children's Mathematics, Science and Technology 2

S1 External 2013

*Institute of Early Childhood*

## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Information</td>
<td>2</td>
</tr>
<tr>
<td>Learning Outcomes</td>
<td>2</td>
</tr>
<tr>
<td>Assessment Tasks</td>
<td>3</td>
</tr>
<tr>
<td>Delivery and Resources</td>
<td>5</td>
</tr>
<tr>
<td>Unit Schedule</td>
<td>5</td>
</tr>
<tr>
<td>Learning and Teaching Activities</td>
<td>7</td>
</tr>
<tr>
<td>Policies and Procedures</td>
<td>8</td>
</tr>
<tr>
<td>Graduate Capabilities</td>
<td>9</td>
</tr>
<tr>
<td>Changes since First Published</td>
<td>17</td>
</tr>
</tbody>
</table>

**Disclaimer**

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.
General Information

Unit convenor and teaching staff
Unit Convenor
Kate Highfield
kate.highfield@mq.edu.au
Contact via kate.highfield@mq.edu.au

Credit points
3

Prerequisites
39cp and (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://students.mq.edu.au/important-dates](https://students.mq.edu.au/important-dates)

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, NSW 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**

<table>
<thead>
<tr>
<th>Name</th>
<th>Weighting</th>
<th>Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment 1</td>
<td>30%</td>
<td>weekly</td>
</tr>
<tr>
<td>Assessment 2</td>
<td>35%</td>
<td>18th April OR 6th June</td>
</tr>
<tr>
<td>Assessment 3</td>
<td>35%</td>
<td>18th April OR 6th June</td>
</tr>
</tbody>
</table>

**Assessment 1**

**Due:** weekly  
**Weighting:** 30%

Each week, following completion of readings and online content students complete a brief (maximum 5 questions) quiz or reflective post. Six posts over semester will be marked.

This Assessment Task relates to the following Learning Outcomes:

- Continue to develop an understanding of the major theoretical developments in early childhood mathematics, science and technology education.
- 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 2**

**Due:** 18th April OR 6th June  
**Weighting:** 35%
Students complete a mini unit of work for science using SMARTnotebook as an instructional technology. Further details of this assessment task can be found in the unit outline on iLearn.

This Assessment Task relates to the following 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.
- 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.
- 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 3
Due: 18th April OR 6th June
Weighting: 35%

Students select a strand from the mathematics syllabus a develop a series of lessons for children in schools, demonstrating sequential understanding of tasks. Further details of this assessment task can be found in the unit outline on iLearn.

This Assessment Task relates to the following 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.
- 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.
• 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.

Delivery and Resources

Delivery

The unit is taught through a combination of online lectures and tutorials. The use of the iLearn Discussion Board is an integral part in the teaching and learning of all students.

All students are required to read the set weekly readings and listen to the online lectures each week. Students are then to complete to the online task.

All students are required to actively participate in discussions and hands on activities during tutorial sessions, online and at on campus sessions (for externals).

Resources

The core text for this unit follows on from ECH232: Charlesworth, R. & Lind, K.L (2012). Math and Science for young children (Seventh Edition). Wadsworth Cengage Learning. Students are also required to access a range of resources through e-reserve and journal finder.

Technology

This unit expects sound use of online tools, word processing and presentation software. In addition students are required to download SMARTnotebook (code provided after training) or access this tool on the departmental computers.

Changes since last offering

Since this unit was last offered in 2012 a restructure of content has occurred to enable cyclic tutorials and increased access to specialised staff. This has resulted in altered classes (online lectures only), cyclic tutorials and altered assignments.

Unit Schedule

The following table serves as a guid to the unit schedule. Further detail of this can be found in the unit outline available via iLearn.
### Unit guide  ECH 335 Young Children's Mathematics, Science and Technology 2

<table>
<thead>
<tr>
<th>Week (week beginning)</th>
<th>Tutorial Group A (Tuesday 11am starting in X5B041)</th>
<th>Tutorial Group B (Tuesday 11am starting in X5B045)</th>
<th>Tutorial Group C (Tuesday 11am starting in X5B251)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25th February</td>
<td>Introduction to the unit (online content only.) NO TUTORIAL CLASSES</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>4th March</td>
<td>Mathematics Topic 1 (Jane Frazer – X5B 041)</td>
<td>Science Topic 1 (Camilla Gordon – X5B 045)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ICT Topic 1 (Kate Highfield – X5B 251)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>11th March</td>
<td>Mathematics Topic 2 (Jane Frazer – X5B 041)</td>
<td>Science Topic 2 (Camilla Gordon – X5B 045)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ICT Topic 2 (Kate Highfield – X5B 251)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>18th March</td>
<td>Mathematics Topic 3 (Jane Frazer – X5B 041)</td>
<td>Science Topic 3 (Camilla Gordon – X5B 045)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ICT Topic 3 (Kate Highfield – X5B 251)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>25th March</td>
<td>Science Topic 1 (Camilla Gordon – X5B 045)</td>
<td>ICT Topic 1 (Kate Highfield – X5B 251)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mathematics Topic 1 (Jane Frazer – X5B 041)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>2nd April</td>
<td>Science Topic 2 (Camilla Gordon – X5B 045)</td>
<td>ICT Topic 2 (Jane Frazer – X5B 041)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mathematics Topic 2 (Jane Frazer – X5B 041)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>8th April</td>
<td>Science Topic 3 (Camilla Gordon – X5B 045)</td>
<td>ICT Topic 3 (Jane Frazer – X5B 041)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mathematics Topic 3 (Jane Frazer – X5B 041)</td>
<td></td>
</tr>
</tbody>
</table>

On Campus Day 1 – 24th March (Science and Technology)

<table>
<thead>
<tr>
<th>5</th>
<th>25th March</th>
<th>Science Topic 1 (Camilla Gordon – X5B 045)</th>
<th>ICT Topic 1 (Kate Highfield – X5B 251)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>2nd April</td>
<td>Science Topic 2 (Camilla Gordon – X5B 045)</td>
<td>ICT Topic 2 (Jane Frazer – X5B 041)</td>
</tr>
</tbody>
</table>

15th April – 28th April  Mid Semester Break
Learning and Teaching Activities

Weekly readings

Each week students complete a series of readings (both compulsory and optional) to develop understandings about the current module of learning.
Weekly online lecture
Each week students engage with a weekly online lecture (or series of short lectures) as appropriate for the module of learning

Weekly quiz tasks
Following completion of set readings and engagement with the online lecture, students complete a short answer quiz to evaluate their understanding of the content they've explored

Tutorials and On Campus
Internal students attend tutorials, and externals attend the equivalent on campus day, to engage with the "hands on" component of this unit, its resources and tasks

Assessment Tasks
Student completion of assessment tasks provides opportunity to consolidate reflect and create resources. Marking then provides an opportunity to give students feedback on their work to date.

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:

- Special Consideration Policy [http://www.mq.edu.au/policy/docs/special_consideration/policy.html]

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

Student Support
Macquarie University provides a range of Academic Student Support Services. Details of these services can be accessed at: [http://students.mq.edu.au/support/]

UniWISE provides:
- Online learning resources and academic skills workshops [http://www.students.mq.edu.au/support/learning_skills/]
- Personal assistance with your learning & study related questions.
- The Learning Help Desk is located in the Library foyer (level 2).
- Online and on-campus orientation events run by Mentors@Macquarie.
Graduate Capabilities

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

• 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.

Assessment tasks

• Assessment 2
• Assessment 3

Learning and teaching activities

• Each week students engage with a weekly online lecture (or series of short lectures) as appropriate for the module of learning
• Following completion of set readings and engagement with the online lecture, students complete a short answer quiz to evaluate their understanding of the content they've
explored

• Internal students attend tutorials, and externals attend the equivalent on campus day, to engage with the "hands on" component of this unit, its resources and tasks
• Student completion of assessment tasks provides opportunity to consolidate reflect and create resources. Marking then provides an opportunity to give students feedback on their work to date.

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.
• 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.
• 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

• Assessment 1
Learning and teaching activities

- Each week students complete a series of readings (both compulsory and optional) to develop understandings about the current module of learning.
- Each week students engage with a weekly online lecture (or series of short lectures) as appropriate for the module of learning.
- Following completion of set readings and engagement with the online lecture, students complete a short answer quiz to evaluate their understanding of the content they’ve explored.
- Internal students attend tutorials, and externals attend the equivalent on campus day, to engage with the "hands on" component of this unit, its resources and tasks.
- Student completion of assessment tasks provides opportunity to consolidate reflect and create resources. Marking then provides an opportunity to give students feedback on their work to date.

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.
- 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

- Assessment 2
- Assessment 3
Learning and teaching activities

• Each week students complete a series of readings (both compulsory and optional) to develop understandings about the current module of learning.
• Each week students engage with a weekly online lecture (or series of short lectures) as appropriate for the module of learning
• Following completion of set readings and engagement with the online lecture, students complete a short answer quiz to evaluate their understanding of the content they've explored
• Internal students attend tutorials, and externals attend the equivalent on campus day, to engage with the "hands on" component of this unit, its resources and tasks
• Student completion of assessment tasks provides opportunity to consolidate reflect and create resources. Marking then provides an opportunity to give students feedback on their work to date.

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

• 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 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.
• 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

• Assessment 1
• Assessment 2
• Assessment 3

Learning and teaching activities

• Each week students complete a series of readings (both compulsory and optional) to develop understandings about the current module of learning.
• Following completion of set readings and engagement with the online lecture, students complete a short answer quiz to evaluate their understanding of the content they've explored
• Internal students attend tutorials, and externals attend the equivalent on campus day, to engage with the "hands on" component of this unit, its resources and tasks
• Student completion of assessment tasks provides opportunity to consolidate reflect and create resources. Marking then provides an opportunity to give students feedback on their work to date.

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.
• 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

• Assessment 2
• Assessment 3
Learning and teaching activities

- Internal students attend tutorials, and externals attend the equivalent on campus day, to engage with the "hands on" component of this unit, its resources and tasks
- Student completion of assessment tasks provides opportunity to consolidate reflect and create resources. Marking then provides an opportunity to give students feedback on their work to date.

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

- 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

- Assessment 1
- Assessment 2
- Assessment 3

Learning and teaching activities

- Following completion of set readings and engagement with the online lecture, students complete a short answer quiz to evaluate their understanding of the content they've explored
- Internal students attend tutorials, and externals attend the equivalent on campus day, to engage with the "hands on" component of this unit, its resources and tasks
- Student completion of assessment tasks provides opportunity to consolidate reflect and create resources. Marking then provides an opportunity to give students feedback on their work to date.

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 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.
• 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

• Assessment 2
• Assessment 3

Learning and teaching activities

• Each week students engage with a weekly online lecture (or series of short lectures) as appropriate for the module of learning
• Student completion of assessment tasks provides opportunity to consolidate reflect and create resources. Marking then provides an opportunity to give students feedback on their work to date.

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

• 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

https://unitguides.mq.edu.au/unit_offerings/33044/unit_guide/print
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 task**

• Assessment 2

**Learning and teaching activity**

• Each week students engage with a weekly online lecture (or series of short lectures) as appropriate for the module of learning
• Student completion of assessment tasks provides opportunity to consolidate reflect and create resources. Marking then provides an opportunity to give students feedback on their work to date.

**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**

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

- Assessment 3

Learning and teaching activity

- Each week students complete a series of readings (both compulsory and optional) to develop understandings about the current module of learning.
- Student completion of assessment tasks provides opportunity to consolidate reflect and create resources. Marking then provides an opportunity to give students feedback on their work to date.

Changes since First Published

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>06/06/2013</td>
<td>The Description was updated.</td>
</tr>
</tbody>
</table>