



**UNSW**  
SYDNEY

**Arts & Social Sciences**

**School of Education**

**EDST6784: Science and Technology**

**Term T2C 2019**

# Contents

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### **IMPORTANT:**

**For student policies and procedures relating to assessment, attendance and student support, please see website, <https://education.arts.unsw.edu.au/students/courses/course-outlines/>**

**The School of Education acknowledges the Bedegal people as the traditional custodians of the lands upon which we learn and teach.**

## 1. LOCATION

Faculty of Arts and Social Sciences  
School of Education  
EDST6784 Science and Technology (6 units of credit)  
Term 2 2019

## 2. STAFF CONTACT DETAILS

Course Coordinator(s): Firase Elmouhamed  
Email: [f.elmouhamed@unsw.edu.au](mailto:f.elmouhamed@unsw.edu.au)  
Availability: Available via email

## 3. COURSE DETAILS

<b>Course Name</b>	Science and Technology
<b>Credit Points</b>	6 units of credit (uoc)
<b>Workload</b>	Includes 150 hours including class contact hours, readings, class preparation, assessment, follow up activities, etc.
<b>Schedule</b>	<a href="http://classutil.unsw.edu.au/EDST_T2.html">http://classutil.unsw.edu.au/EDST_T2.html</a> Lectures: Thursdays 4-530pm (10 weeks: 25 July to 26 September) Lecture location: Matraville Sports High School (UNSW Annex) Online: Required weekly activities (see Moodle for details)

## SUMMARY OF THE COURSE

This course entails understanding of the syllabus, curriculum planning, appropriate assessment strategies, classroom management and development/selection of activities and resources relevant to the teaching of science and technology in the primary school classroom. Students will engage in evaluation and selection/development/evaluation of activities and resources relevant to the teaching of science and technology in the primary (K-6) classroom.

## AIMS OF THE COURSE

The aim of the course is to develop understandings of the nature of science and technology, key concepts, and the teaching of science and technology across years K-6. In order to focus on core skills of Working Scientifically and Working Technologically, students will develop competence and confidence in planning relevant learning experiences which take into account the pedagogies of science and technology and the needs of diverse learners. The course will examine scientific understandings and advances, as well as the technologies enabling rapid developments in understanding. Teaching the cross-curriculum priority of sustainability will be explored, in conjunction with the content strands of Natural Environment and Made Environment along with the capabilities of ICT, ethical understanding and critical and creative thinking.

## THE MAIN WAYS IN WHICH THE COURSE HAS CHANGED SINCE LAST TIME AS A RESULT OF STUDENT FEEDBACK:

- The number of assessments have been reduced from three to two tasks
- The course has been more closely integrated with the INSTEP component through the re-designed assessment tasks that enable students to design, teach and evaluate a series of three science and technology lessons

## STUDENT LEARNING OUTCOMES

Outcome		Assessment/s
1	Demonstrate awareness and understanding of appropriate ways to harness children's natural curiosities and their sense of wonder, and develop interest and enthusiasm for science and technology.	1, 2
2	Demonstrate how the skills, knowledge and understanding of syllabus documents relate across strands and sub-strands for all Stages.	1, 2
3	Demonstrate ability to critically examine and evaluate relevant research and pedagogies to enable primary-aged students to engage and learn the skills and concepts of science and technology effectively.	1, 2
4	Demonstrate understanding of the nature of science as well as knowledge of areas of scientific and technological content	1, 2
5	Demonstrate understanding of why ICT is integrated with science and ability to integrate it into Science and other KLAs effectively.	1, 2
6	Demonstrate ability to develop a unit of work which incorporates skill development embedded in effective learning experiences	1, 2

## AITSL PROFESSIONAL GRADUATE TEACHER STANDARDS

Standard		Assessment/s
1.1.1	Demonstrate knowledge and understanding of physical, social and intellectual development and characteristics of students and how these may affect learning	1, 2
1.2.1	Demonstrate knowledge and understanding of research into how students learn and the implications for teaching	1, 2
1.5.1	Demonstrate knowledge and understanding of strategies for differentiating teaching to meet the specific learning needs of students across the full range of abilities	1, 2
2.1.1	Demonstrate knowledge and understanding of the concepts, substance and structure of the content and teaching strategies of the teaching area	1, 2
2.2.1	Organise content into an effective learning and teaching sequence	1
2.3.1	Use curriculum, assessment and reporting knowledge to design learning sequences and lesson plans	1
2.6.1	Implement teaching strategies for using ICT to expand curriculum learning opportunities for students	1, 2
3.2.1	Plan lesson sequences using knowledge of student learning, content and effective teaching strategies	1, 2
3.3.1	Include a range of teaching strategies	1, 2
3.5.1	Demonstrate a range of verbal and nonverbal communication strategies to support student engagement	2
3.6.1	Demonstrate broad knowledge of strategies that can be used to evaluate teaching programs to improve student learning	1
4.2.1	Demonstrate the capacity to organise classroom activities and provide clear directions	2

4.5.1	Demonstrate an understanding of relevant issues and the strategies available to support the safe, responsible and ethical use of ICT in learning and teaching	1, 2
5.1.1	Demonstrate understanding of assessment strategies including informal and formal, diagnostic, formative and summative approaches to assess student learning	1,2
5.2.1	Demonstrate an understanding of the purpose of providing timely and appropriate feedback to students about their training	2

#### NATIONAL PRIORITY AREA ELABORATIONS

Priority area		Assessment/s
A. Aboriginal and Torres Strait Islander Education	1, 5, 8,	1, 2
B. Classroom Management	1, 4, 5	1, 2
C. Information and Communication Technologies	1-7, 8, 9,10, 12	1, 2
D. Literacy and Numeracy	1-19	1, 2

#### 4. RATIONALE FOR THE INCLUSION OF CONTENT AND TEACHING APPROACH

The course structure allows students to explore and understand the content and organisation of the NSW K- 6 Science and Technology curriculum. Students will develop and demonstrate the skills they need to plan programs, lessons and activities suitable for different learning styles and stages of development.

#### 5. TEACHING STRATEGIES

The course will run as a series of workshops including lecturer input, practical hands-on tasks and structured and collaborative discussions based on the required readings for each week. Students will also plan, teach and evaluate lessons for their INSTEP school students.

## 6. COURSE CONTENT AND STRUCTURE

Module/Date	Lecture Topic/Readings
1 25 July	<p><b>Introduction</b> to the structure, organisation and content of the <i>Science &amp; Technology K-6 Syllabus</i></p> <p><b>Required Reading:</b>            NESA (2017) <i>Science and Technology K-6 Syllabus</i>. Sydney: NESA. Accessed April 2, 2019 at <a href="https://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/learning-areas/science/science-and-technology-k-6-new-syllabus">https://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/learning-areas/science/science-and-technology-k-6-new-syllabus</a></p>
2 1 August	<p><b>What is STEM and why does it matter?</b></p> <p><b>Required Reading:</b>            English, L. D. (2018). Learning while designing in a fourth-grade integrated STEM problem. <i>International Journal of Technology and Design Education</i>. doi:10.1007/s10798-018-9482-z</p>
3 8 August	<p><b>How can I enable my students to engage with real science?</b></p> <p><b>Required Reading:</b>            Murphy, C., Smith, G., &amp; Broderick, N. (2019). A Starting Point: Provide Children Opportunities to Engage with Scientific Inquiry and Nature of Science. <i>Research in Science Education</i>. doi:10.1007/s11165-019-9825-0</p>
4 15 August	<p><b>How can I use makerspaces to enhance design and technology education?</b></p> <p><b>Required Reading:</b>            Fasso, W., &amp; Knight, B. A. (2019). Identity development in school makerspaces: intentional design. <i>International Journal of Technology and Design Education</i>. doi:10.1007/s10798-019-09501-z</p>
5 22 August	<p><b>How can I build the scientific skills of my students?</b></p> <p><b>Required Reading:</b>            Loughland, T., &amp; Nguyen, H. T. M. (2016). Using the instructional core to implement a professional learning programme for primary science teachers in Australia: teacher learning and student skill outcomes. <i>Teacher Development</i>, 20(4), 498-520. doi:10.1080/13664530.2016.1164748</p>
6 29 August	<p><b>How can I support my students' learning in technology education?</b></p> <p><b>Required Reading:</b>            Fox-Turnbull, W. (2018). Assisting teachers' understanding of student learning in technology. <i>International Journal of Technology and Design Education</i>. Doi:10.1007/s10798-018-9484-x</p>
7 5 Sept	<p><b>How can I effectively assess my students' learning?</b></p> <p><b>Required Reading:</b>            Loughland, T., &amp; Kilpatrick, L. (2015). Formative Assessment in Primary Science. <i>Education 3-13</i>, 43(2), 128-141. Doi:10.1080/03004279.2013.767850</p>
8 12 Sept	<p><b>How can I plan for an integrated continuum across learning stages?</b></p> <p><b>Required Reading:</b>            Strimel, G. J., Kim, E., Grubbs, M. E., &amp; Huffman, T. J. (2019). A meta-synthesis of primary and secondary student design cognition research. <i>International Journal of Technology and Design Education</i>. Doi:10.1007/s10798-019-09505-9</p>

9 19 Sept	<p><b>How can I promote creativity in science teaching and learning?</b></p> <p><b>Required Reading:</b>  Preston, C. M. (2017). Effect of a diagram on primary students' understanding about electric circuits. <i>Research in Science Education</i>, 1-24.</p>
10 26 Sept	<p><b>How can I continue to advance my scientific knowledge and teaching practices?</b></p> <p>Self and peer evaluation of teaching sequence  Reflection (hurdle requirement)  Course evaluation</p>

## 7. RESOURCES

### **Required Readings**

- English, L. D. (2018). Learning while designing in a fourth-grade integrated STEM problem. *International Journal of Technology and Design Education*. Doi:10.1007/s10798-018-9482-z
- Fasso, W., & Knight, B. A. (2019). Identity development in school makerspaces: intentional design. *International Journal of Technology and Design Education*. Doi:10.1007/s10798-019-09501-z
- Fox-Turnbull, W. (2018). Assisting teachers' understanding of student learning in technology. *International Journal of Technology and Design Education*. Doi:10.1007/s10798-018-9484-x
- NESA (2017) *Science and Technology K-6 Syllabus*. Sydney: NESA. Accessed April 2, 2019 at <https://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/learning-areas/science/science-and-technology-k-6-new-syllabus>
- Loughland, T., & Kilpatrick, L. (2015). Formative Assessment in Primary Science. *Education 3-13*, 43(2), 128-141. Doi:10.1080/03004279.2013.767850
- Loughland, T., & Nguyen, H. T. M. (2016). Using the instructional core to implement a professional learning programme for primary science teachers in Australia: teacher learning and student skill outcomes. *Teacher Development*, 20(4), 498-520. Doi:10.1080/13664530.2016.1164748
- Murphy, C., Smith, G., & Broderick, N. (2019). A Starting Point: Provide Children Opportunities to Engage with Scientific Inquiry and Nature of Science. *Research in Science Education*. Doi:10.1007/s11165-019-9825-0
- Preston, C. M. (2017). Effect of a Diagram on Primary Students' Understanding About Electric Circuits. *Research in Science Education*, 1-24.
- Strimel, G. J., Kim, E., Grubbs, M. E., & Huffman, T. J. (2019). A meta-synthesis of primary and secondary student design cognition research. *International Journal of Technology and Design Education*. Doi:10.1007/s10798-019-09505-9

## 8. ASSESSMENT

Assessment Task	Length	Weight	Learning Outcomes Assessed	Graduate Standards Assessed	National Elaborations Assessed	Due Date
Pre-Assessment: Assessing for Learning in Science using ICT	~500 words	Hurdle				Wednesday 24 July By 5.00pm
Assessment 1 Lesson Sequence	2000 words	40%	1, 2, 3, 4, 5	1.1, 1.2, 2.3, 3.6	A1,5,8; B1,4; C1-12; D1-19	Monday 11 Aug By 5.00pm
Assessment 2 Evaluation of student learning in lesson sequence	2000 words	60%	1, 2, 4, 6	1.5, 2.6, 4.5	A1,5,8; B1,4; C1-12; D1-19	Monday 30 Sept By 5.00pm
Reflection: Student impact, knowledge extensions or gaps	~500 words	Hurdle				Friday 4 Oct by 5.00pm

### **Submission of assessments**

Students are required to follow their lecturer's instructions when submitting their work for assessment. All assessment will be submitted online via Moodle by 5pm. Students are also required to keep all drafts, original data and other evidence of the authenticity of the work for at least one year after examination. If an assessment is mislaid the student is responsible for providing a further copy. Please see the Student Policies and Procedures for information regarding submission, extensions, special consideration, late penalties and hurdle requirements etc. <https://education.arts.unsw.edu.au/students/courses/course-outlines/>

### **Assessment Details**

#### **Pre-Assessment: Assessing for Learning in Science using ICT**

Identify and briefly describe three examples of digital technologies which can be used to assess students' scientific understanding. Upload your 500 word response to Moodle before the beginning of the course.

#### **Assessment 1: Lesson Sequence (40%)**

1. Negotiate with your INSTEP teacher (s) to plan and teach a sequence of three lessons during your INSTEP visits in School Term 3. It is very important that you use a topic from their existing scope and sequence. It is not appropriate to impose a lesson sequence that is not in their school plans.
2. Conduct formative assessment of the science and technology knowledge of three students in one class at your INSTEP school
3. Design a sequence of three lessons for this class of students in your INSTEP school
4. Annotate your plans to demonstrate where you have met each of the graduate standards listed in the table above for assessment task 1 (footnotes will work).
5. Justify your choice of assessment, teaching and learning activities through reference to the literature, syllabus documents and other credible professional resources. Most importantly, make reference to the existing ability of the students you will be teaching

#### **Assessment 2 : Evaluation of student learning in lesson sequence (60%)**

1. Teach the lesson sequence you planned in task 1. You are encouraged to make changes to the lessons sequence as you see fit. Show these changes in your text by using pull out boxes or track changes
2. Collect evidence of student learning from the three students you focused on in task 1
3. Modify your lesson plans in response to the student learning evidence you gather from each lesson. Show these changes in your text by using pull out boxes or track changes
4. Modify your teaching in each lesson in response to student learning needs. Justify these changes in relation to student learning
5. Write a critical evaluation of the student learning in these three lessons using the evidence you collected, with reference to your teaching practice and planning as well as the literature covered in this course.
6. As a professional it is up to you to decide which method you will use to structure this text. Use the assessment criteria in the rubric to guide the choices you make.

**Option B is included here if, for some reason, you do not have the opportunity to teach the lessons you planned (in Assessment 1) for Science and Technology during school Term 3:**

**Alternate Option for Assessment 2**

1. Examine the school scope and sequence in Science and Technology
2. Identify three units of work that integrate working scientifically and design and production
3. Explain the relationship of these two skills in these units (with reference to peer-reviewed literature)
4. Evaluate the three units and comment (with reference to peer-reviewed literature) on the extent to which the skills are integrated and ways in which this could be strengthened
5. Modify these three units and justify your changes (with reference to peer-reviewed literature)

**Reflection: Student impact, knowledge extensions or gaps**

Describe three ways in which you would assess the impact of your teaching in this KLA on your future students. If you have a specialisation in this KLA (e.g., a major in your undergraduate degree), describe how you could build on your advanced knowledge/skills to make improvements in student achievement in this KLA in your current school. If you do not have a specialisation in this KLA, identify three areas of your disciplinary knowledge /skills that require further development, and what strategies you will use to achieve that. Upload your 500 word response to Moodle.

**UNSW SCHOOL OF EDUCATION  
FEEDBACK SHEET  
EDST6784 Science and Technology**

Student Name:  
Assessment Task: 1

Student

No.:

SPECIFIC CRITERIA	(-) <span style="font-size: 2em;">➔</span> (+)				
<b>Understanding of the question or issue and the key concepts involved</b> <ul style="list-style-type: none"> <li>• Plans make reference to the formative assessment of three students prior to the lesson</li> <li>• Plans cover key ideas in Science and Technology</li> </ul>					
<b>Depth of analysis and/or critique in response to the task</b> <ul style="list-style-type: none"> <li>• Plans use the literature and the syllabus to justify the choice of learning activities</li> </ul>					
<b>Familiarity with and relevance of professional and/or research literature used to support response</b> <ul style="list-style-type: none"> <li>• Appropriate research references to support responses</li> <li>• Sound range of research references</li> </ul>					
<b>Structure and organisation of response</b> <ul style="list-style-type: none"> <li>• Appropriate nature of structural organisation</li> <li>• Logical and coherent structure</li> <li>• Clear presentation of ideas to enhance readability</li> <li>• Accurate annotations of the graduate standards</li> </ul>					
<b>Presentation of response according to appropriate academic and linguistic conventions</b> <ul style="list-style-type: none"> <li>• Clarity, consistency and appropriateness of conventions for quoting, paraphrasing, attributing sources and information and listing references (APA style)</li> <li>• Clarity and appropriateness of sentence structure, vocabulary use, spelling, punctuation and word length</li> </ul>					
<b>GENERAL COMMENTS/RECOMMENDATIONS FOR NEXT TIME</b>					

**Lecturer**

**Date**

**Recommended:**     /20     (FL PS CR DN HD)

**Weighting: 40%**

NB: The ticks in the various boxes are designed to provide feedback to students; they are not given equal weight in determining the recommended grade. Depending on the nature of the assessment task, lecturers may also contextualize and/or amend these specific criteria. **The recommended grade is tentative only, subject to standardisation processes and approval by the School of Education Learning and Teaching Committee.**

**UNSW SCHOOL OF EDUCATION  
FEEDBACK SHEET  
EDST6784 Science and Technology**

Student Name:  
Assessment Task: 2

Student

No.:

SPECIFIC CRITERIA	(-) <span style="font-size: 2em;">➤</span> (+)				
<b>Understanding of the question or issue and the key concepts involved</b> <ul style="list-style-type: none"> <li>The main focus of the text is on student learning</li> </ul>					
<b>Depth of analysis and/or critique in response to the task</b> <ul style="list-style-type: none"> <li>Text uses evidence of student learning and the literature covered in the course to conduct a critical analysis that presents both points and counterpoints.</li> </ul>					
<b>Familiarity with and relevance of professional and/or research literature used to support response</b> <ul style="list-style-type: none"> <li>Appropriate research references to support responses</li> <li>Sound range of research references</li> </ul>					
<b>Structure and organisation of response</b> <ul style="list-style-type: none"> <li>Appropriate nature of structural organisation</li> <li>Logical and coherent structure</li> <li>Clear presentation of ideas to enhance readability</li> </ul>					
<b>Presentation of response according to appropriate academic and linguistic conventions</b> <ul style="list-style-type: none"> <li>Clarity, consistency and appropriateness of conventions for quoting, paraphrasing, attributing sources and information and listing references (APA style)</li> <li>Clarity and appropriateness of sentence structure, vocabulary use, spelling, punctuation and word length</li> </ul>					
<b>GENERAL COMMENTS/RECOMMENDATIONS FOR NEXT TIME</b>					

**Lecturer**

**Date**

**Recommended:**     /20     (FL PS CR DN HD)

**Weighting: 60%**

NB: The ticks in the various boxes are designed to provide feedback to students; they are not given equal weight in determining the recommended grade. Depending on the nature of the assessment task, lecturers may also contextualize and/or amend these specific criteria. **The recommended grade is tentative only, subject to standardisation processes and approval by the School of Education Learning and Teaching Committee.**