School of Education

EDST6784 Science and Technology

Term 2 2021

Contents

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, Design & Architecture
School of Education
EDST6784 Science and Technology (6 units of credit)
Term 2 2021

2. STAFF CONTACT DETAILS

Course Convenor:	John Johnstone
Email:	TBC
Availability:	Post course enquiries on the course forum. Use email for confidential communications.

3. COURSE DETAILS

Course Name	Science and Technology (K-6)
Credit Points	6 units of credit (uoc)
Workload	Includes 150 hours including class contact hours, readings, class preparation, assessment, follow up activities, etc.
Schedule	http://classutil.unsw.edu.au/EDST_T2.html#EDST6784T2C

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:

- Tutorial time has been extended
- Blended (in person and online components) and fully online options are now available
- Re-designed for a more integrated approach to science and technology over 6 weeks

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

AUSTRALIAN PROFESSIONAL STANDARDS FOR TEACHERS

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 in teaching	1, 2
3.6.1	Demonstrate broad knowledge of strategies that can be used to evaluate teaching programs to improve student learning	1
4.5.1	Demonstrate an understanding of the relevant issues and the strategies available to support the safe, responsible and ethical use of ICT in learning and teaching	1, 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	1-10, 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. Teaching and assessment tasks provide opportunities to develop resources and apply them to record and present their findings for an investigation into a scientific question. The importance of literacy and numeracy skills for science is demonstrated, along with opportunities to integrate science and technology with other KLAs.

5. TEACHING STRATEGIES

The course will run as an intensive 6-week program of study including lectures, practical hands-on tasks, structured and collaborative discussions, and on-line activities.

6. COURSE CONTENT AND STRUCTURE

This unit of study involves a 6-week program. This is an ***indicative*** topic schedule/reading plan. Refer to Moodle for the most current schedule and readings. Throughout the course, the content ***may*** change to be adapted to the students' learning needs and interests.

Module	Topic
1	**Introduction to the structure and organisation of the *Science and Technology K-6* Syllabus** Unpacking the integration of pedagogical approaches of Science and Technology. Overview of inquiry questions and focus questions. **Readings and resources:** NESA (2017) *Guide New K-6 Science and Technology Syllabus.* Sydney https://www.educationstandards.nsw.edu.au/wps/wcm/connect/dac0b1f9-b943-486b-96fb-6ed6c44cadee/guide-science-and-technology-k-6-new-syllabus.pdf?MOD=AJPERES&CVID= NESA (2017) *Science and Technology K-6 Syllabus.* Sydney. https://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/learning-areas/science/science-and-technology-k-6-new-syllabus Brown, R. A., & Brown, J. W. (2010). What is Technology Education? A Review of the "Official Curriculum". *The Clearing House: A Journal of Educational Strategies, Issues and Ideas, 83*(2), 49-53. doi:10.1080/00098650903505449
2	**Physical World** Deep dive into the Physical World strand. Look at the continuum of learning. Unpack the use of inquiry and focus questions to frame learning. **Readings:** Preston, C. M. (2019). Effect of a diagram on primary students' understanding about electric circuits. *Research in Science Education, 49*(5), 1433-1456. King, D., & English, L. D. (2016). Engineering design in the primary school: applying stem concepts to build an optical instrument. *International Journal of Science Education, 38*(18), 2762-2794. doi:10.1080/09500693.2016.1262567
3	**Material World** Deep dive into the Material World strand. Look at the continuum of learning. Unpack the use of inquiry and focus questions to frame learning. **Readings:** Skamp, K. (2011). Teaching chemistry in primary science: what does the research suggest? *Teaching Science., 57*(4), 37–43. Hudson, P., English, L., Dawes, L., King, D., & Baker, S. (2015). Exploring Links between Pedagogical Knowledge Practices and Student Outcomes in STEM Education for Primary Schools. *Australian Journal of Teacher Education, 40*(6). http://dx.doi.org/10.14221/ajte.2015v40n6.8

4	**Earth and Space** Deep dive into the Earth and Space strand. Look at the continuum of learning. Unpack the use of inquiry questions to frame learning. **Readings:** Thornburgh, B., Tretter, T., & Duckwall, M. (2015). Seeing the solar system through two perspectives: Primary students explore Earth and space science by modeling and observing patterns. *Science and Children, 53*(4), 42-51. Aktamış, H., Acar, E., & Çoban, G.Ü. (2015). A summer camp experience of primary student: Let's learn astronomy, explore the space summer camp. *Asia - Pacific Forum on Science Learning and Teaching, 16*(1) https://www.eduhk.hk/apfslt/v16_issue1/aktamis/index.htm
5	**Living World** Deep dive into the Living World strand. Look at the continuum of learning. Unpack the use of inquiry questions to frame learning. **Readings:** Vikström, A. (2008). What is intended, what is realized, and what is learned? Teaching and learning biology in the primary school classroom. *Journal of Science Teacher Education, 19*(3), 211-233. doi:10.1007/s10972-008-9090-y Jones, M., Weitkamp, E., Kimberlee, R., Salmon, D., & Orme, J. (2012). Realizing a holistic approach to food through school gardens and growing activities. *Children, Youth and Environments, 22*(1), 75-98. doi:10.7721/chilyoutenvi.22.1.0075
6	**Planning for the continuum of learning and assessment** The importance of the continuum of learning in science and technology and how to plan for effective assessment. **Readings:** 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 Loughland, T., & Kilpatrick, L. (2015). Formative assessment in primary science. *Education 3-13, 43*(2), 128-141. doi:10.1080/03004279.2013.767850

7. RESOURCES

See Leganto on Moodle for access to required readings and additional recommendations.

8. ASSESSMENT

Assessment Task	Length	Weight	Learning Outcomes Assessed	Australian Professional Standards Assessed	National Elaboration Areas Assessed	Due Date
Assessment 1: Inquiry and focus questions	2500 words	40%	1-6	1.1.1, 1.2.1, 1.5.1, 2.1.1, 2.2.1, 2.3.1, 2.6.1, 3.2.1, 3.3.1, 3.6.1, 4.5.1	A1, A5, A8 B1, B4, B5 C1-10, C12 D1-19	Monday 2nd August by 5pm
Assessment 2: Design and production	3000 words (equiv)	60%	1-6	1.1.1, 1.2.1, 1.5.1, 2.1.1, 2.6.1, 3.2.1, 3.3.1, 4.5.1	A1, A5, A8 B1, B4, B5 C1-10, C12 D1-19	Wednesday 25th August by 5pm

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

Assessment 1: Inquiry and focus questions (40%)

Develop your own skills of Working Scientifically, and Design and Production by developing and addressing 5 inquiry or focus questions (1 per strand of the syllabus) = 500 words each. Submit a 2500-word critical synthesis that draws together the five strands using the appropriate literature.

See Moodle for a template and details.

Assessment 2: Design and production (60%)

This assessment relates to the Physical World strand of the NSW K-6 syllabus. You will be developing an educational toy using the Design and Production process with your nominated Stage of students.

Your submission will include the following:

- an outline of 6 lessons for a nominated Stage that will be used to develop a toy used for investigating a relevant nominated section of the Physical World syllabus (1000 words)
- a portfolio that includes images of the steps you performed in your design and production processes and explains the development process including planning, testing and changes made to the design (1500 words)
- a 3 minute video that demonstrates your toy being used in an investigation.
- a Concept Cartoon that could be used to introduce a concept in the chosen Physical World content.

See Moodle for a template and details.

UNSW SCHOOL OF EDUCATION
FEEDBACK SHEET
EDST6784 Science and Technology (K-6)

Student Name: Student Number:
Assessment Task 1: **Inquiry and focus questions**

SPECIFIC CRITERIA	(-) ➤ (+)				
Understanding of the question or issue and the key concepts involved • Inquiry and focus questions are clear and provide a good basis for investigation • Aspects of student safety, interest, and activity engagement addressed					
Depth of analysis and/or critique in response to the task • Appropriate implementation of either Working Scientifically or Design and Production • Uses evidence of learning and relevant literature to conduct a critical analysis that presents both points and counterpoints.					
Familiarity with and relevance of professional and/or research literature used to support response • Appropriate research references to support responses • Sound range of research references					
Structure and organisation of response • Logical and coherent structure (see template for requirements) • Clear presentation of ideas and images to enhance readability					
Presentation of response according to appropriate academic and linguistic conventions • Clarity, consistency and appropriateness of conventions for quoting, paraphrasing, attributing sources and information and listing references (APA style) • Clarity and appropriateness of sentence structure, vocabulary use, spelling, punctuation and word length					
GENERAL COMMENTS/RECOMMENDATIONS FOR NEXT TIME					

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 (K-6)

Student Name: Student Number:
Assessment Task 2: **Design and production**

SPECIFIC CRITERIA	(-) ⟶ (+)				
Understanding of the question or issue and the key concepts involved • Design and Production folio is comprehensive					
Depth of analysis and/or critique in response to the task • Use of literature and clear links to the syllabus to justify choices • Uses learning from investigation activities to inform design solutions • Develops an informed design solution					
Familiarity with and relevance of professional and/or research literature used to support response • Appropriate research references to support responses • Sound range of research references					
Structure and organisation of response • Logical and coherent structure (see template for requirements) • Clear presentation of ideas, images, video to enhance readability and viewing					
Presentation of response according to appropriate academic and linguistic conventions • Clarity, consistency and appropriateness of conventions for quoting, paraphrasing, attributing sources and information and listing references (APA style) • Clarity and appropriateness of sentence structure, vocabulary use, spelling, punctuation and word length (and max length of video).					
GENERAL COMMENTS/RECOMMENDATIONS FOR NEXT TIME					

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.**