



UNSW
SYDNEY

School of Education

EDST6922
Science Method 1

Term 1 2022

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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, Design & Architecture
School of Education
EDST6922 Science Method 1 (6 units of credit)
Term 1 2022

2. STAFF CONTACT DETAILS

Course Coordinator: TBC
Email: tbc@unsw.edu.au
Availability: Please email for an appointment

3. COURSE DETAILS

| | |
|----------------------|---|
| Course Name | Science Method 1 |
| Credit Points | 6 units of credit (uoc) |
| Workload | Includes 150 hours including class contact hours, readings, class preparation, assessment, follow up activities, etc. |
| Schedule | EDST E 2022 Class Utilisation Summary (unsw.edu.au) |

SUMMARY OF COURSE

This initial teacher education course is designed to develop appropriate pedagogies for teaching Science, as well as offering an insight into the principles and practices for learning Science. Teacher education students will develop skills in planning and teaching lessons, contextualising science within the broader school curriculum, managing practical work in science classrooms and integrating ICT resources into lessons. Important issues such as student prior learning (including stage 3 outcomes), assessment, student differences and safety are also considered. Teacher education students will critically evaluate models of pedagogy and the features of effective classroom practice. The course focuses on the requirements and philosophy of the NSW Science syllabus for Years 7-10, including Year 7-10 Life Skills advice, outcomes, and content.

STUDENT LEARNING OUTCOMES

| Outcome | | Assessment/s |
|---------|---|--------------|
| 1 | Identify foundational aspects and structure of the <i>NSW Science K-10 Syllabus</i> and the depth of subject knowledge required to implement the syllabus with specific emphasis on stages 4 and 5. | 1,2 |
| 2 | Evaluate how student characteristics affect learning and evaluate implications for teaching students with different characteristics and from diverse backgrounds. | 1,2 |
| 3 | Use a range of strategies to plan and teach effective lessons to engage all students, address relevant syllabus outcomes and ensure a safe learning environment. | 1,2 |
| 4 | Plan teaching strategies which effectively communicate scientific thinking and problem-solving techniques; planning, conducting, and communicating results of investigations; and central ideas in Science and common student misconceptions. | 1,2 |
| 5 | Design and evaluate formative assessment strategies and include assessment <i>for</i> learning and <i>as</i> learning opportunities in Science education. | 1,2 |
| 6 | Select appropriate resources, including ICT, to engage students and expand learning opportunities. | 2 |
| 7 | Describe strategies that support students' wellbeing and safety in the Science setting, and curriculum and legislative requirements related to safety in Science. | 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 |
| 1.2.1 | Demonstrate knowledge and understanding of research into how students learn and the implications for teaching. | 1,2 |
| 1.3.1 | Demonstrate knowledge of teaching strategies that are responsive to the learning strengths and needs of students from diverse linguistics, cultural, religious, and socioeconomic backgrounds. | 1,2 |
| 1.4.1 | Demonstrate broad knowledge and understanding of the impact of culture, cultural identity, and linguistic background on the education of students from Aboriginal and Torres Strait Islander backgrounds. | 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. | 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 |
| 2.3.1 | Use curriculum, assessment and reporting knowledge to design learning sequences and lesson plans. | 1,2 |
| 2.4.1 | Demonstrate broad knowledge of, understanding of and respect for Aboriginal and Torres Strait Islander histories, cultures, and languages. | 2 |
| 2.5.1 | Know and understand literacy and numeracy teaching strategies and their application in teaching areas. | 1,2 |
| 2.6.1 | Implement teaching strategies for using ICT to expand curriculum learning opportunities for students. | 1,2 |
| 3.1.1 | Set learning goals that provide achievable challenges for students of varying characteristics. | 1,2 |
| 3.2.1 | Plan lesson sequences using knowledge of student learning, content, and effective teaching strategies. | 2 |
| 3.3.1 | Include a range of teaching strategies. | 1,2 |
| 3.4.1 | Demonstrate knowledge of a range of resources including ICT that engage students in their learning. | 1,2 |

| | | |
|-------|--|-----|
| 3.5.1 | Demonstrate a range of verbal and non-verbal communication strategies to support student engagement. | 1,2 |
| 3.6.1 | Demonstrate broad knowledge of strategies that can be used to evaluate teaching programs to improve student learning. | 2 |
| 4.2.1 | Demonstrate the capacity to organise classroom activities and provide clear directions. | 1 |
| 4.4.1 | Describe strategies that support students' wellbeing and safety working within school and/or system, curriculum and legislative requirements. | 1 |
| 5.1.1 | Demonstrate understanding of assessment strategies, including informal and formal, diagnostic, formative, and summative approaches to assess student learning. | 2 |
| 6.3.1 | Seek and apply constructive feedback from supervisors and teachers to improve teaching practices. | 2 |

NATIONAL PRIORITY AREA ELABORATIONS

| Priority area | | Assessment/s |
|--|-------------------|--------------|
| A. Aboriginal and Torres Strait Islander Education | 4,7 | 2 |
| B. Classroom Management | 1 | 1 |
| C. Information and Communication Technologies | 1,3-6,10,12 | 1,2 |
| D. Literacy and Numeracy | 1,3-5, 8-12,18-19 | 1,2 |
| E. Students with Special Educational Needs | 7 | 1,2 |
| F. Teaching Students from Non-English-Speaking Backgrounds | 4-5 | 1,2 |

4. RATIONALE FOR THE INCLUSION OF CONTENT AND TEACHING APPROACH

Lectures, tutorials, and assignments will cover a variety of approaches to teaching and learning in the Science classroom. Emphasis will be placed on the relationship between the nature and practice of Science, the role and value of science in society and science pedagogy. A particular focus will be on strategies that can promote student engagement and achievement in Science.

Student-centred activities will form the basis of the course. These activities will draw on the prior discipline knowledge of the students and will allow them to engage in relevant and challenging experiences that mirror those they will be expected to design for the range of secondary students they will later teach.

5. TEACHING STRATEGIES

- Explicit teaching to foster an understanding of students' different approaches to learning and the use of a range of teaching strategies to foster interest and support learning.
- Small group cooperative learning to develop teamwork in an educational context and to demonstrate the use of group structures to address teaching and learning goals.
- Structured occasions for reflection on learning to allow students to reflect critically on and improve teaching practice.
- Extensive opportunities for whole group and small group dialogue and discussion, allowing students the opportunity to demonstrate their capacity to communicate and liaise with the diverse members of an education community, and to demonstrate their knowledge and understanding of method content.
- Online learning from readings on the Moodle website and online discussions.
- Microteaching: students will prepare and deliver a ten-minute demonstration lesson to their peers.
- In tutorials, students will work in small groups to develop diverse products such as contexts, sections of units of work, lesson plans, teaching resources, and assessment tasks. Each group will upload and share their work in progress to Moodle by 8:00pm. A debriefing session will be conducted after work submission during each tutorial.

These activities will occur in a classroom climate that is supportive and inclusive of all learners.

6. COURSE CONTENT AND STRUCTURE

| Module | Lecture | Tutorial |
|--------|---|---|
| 1 | <p>Introduction to course</p> <ul style="list-style-type: none"> • Introduction to structure and requirements • Developing contexts: (1) making Science relevant in the broader school curriculum and (2) incorporating the nature of scientific thinking, the history of science and skills for working scientifically • Physical, social, and intellectual development of students and how this affects their engagement in learning | <ul style="list-style-type: none"> • What should be the nature of Science teaching in contemporary schools? • Research on how students learn |
| 2 | <p>Stage 4/5 Syllabus</p> <ul style="list-style-type: none"> • Transition from Stage 3 to Stage 4 Science • Deconstructing the Stage 4/5 Syllabus: structure, requirements, and associated documents • Teaching strategies for Science | <ul style="list-style-type: none"> • Workshop to explore and evaluate the suitability of teaching strategies to meet learning goals and outcomes |
| 3 | <p>Lesson planning</p> <ul style="list-style-type: none"> • Using the syllabus to plan Stage 4/5 lessons • Planning Stage 4/5 lessons, including digital resources • Setting challenging learning goals in lesson planning • Developing a repertoire of teaching strategies for Science teaching • How culture, cultural identity, and linguistic background impact Aboriginal and Torres Strait Islander students <p>Demonstration of microteaching</p> | <ul style="list-style-type: none"> • Setting high expectations for learning • Strategies for making learning goals explicit for students • How to structure instructions, questioning and transitions between activities • Developing culturally responsive teaching strategies and resources |
| 4 | <p>Practical Work and the Working Scientifically Outcomes</p> <ul style="list-style-type: none"> • Incorporation of literacy, digital literacy, and numeracy strategies • Safety in the Science Laboratory <p>Microteaching</p> <ul style="list-style-type: none"> • Organisation of classroom activities • Providing clear directions | <ul style="list-style-type: none"> • Explicit teaching of literacy, numeracy and ICT tools when needed <p>Microteaching</p> |
| 5 | <p>Off-site: Matraville High School</p> <ul style="list-style-type: none"> • Orientation to a high school laboratory • Safety and conducting practical work in a high school laboratory • Modelling practical Science Stage 4/5 lessons | <ul style="list-style-type: none"> • Peer assessment of WHS • Develop a lesson plan for a practical demonstration <p>Microteaching</p> |

| | | |
|----------------------------------|--|--|
| 6 | Off-site: Matraville High School <ul style="list-style-type: none"> Strategies for managing practical work, including promoting inclusion and supporting students with disabilities Using data loggers | <ul style="list-style-type: none"> Practical Demonstrations Microteaching |
| 7 | Planning Units of Work <ul style="list-style-type: none"> Using the Stage 4/5 Syllabus to sequence subject content across lessons within a unit of work Planning Units of Work: embedding Aboriginal and Torres Strait Islander histories and cultures in Science | <ul style="list-style-type: none"> Content selection and scope of content for effective lesson sequences for one stage Microteaching |
| Week 8 | | Method Break |
| 9 (Online, F2F, asynchron) | Teaching strategies to respond to individual needs and backgrounds <ul style="list-style-type: none"> Importance of matching teaching strategies to individual needs Appropriate selection of ICT resources to support learning | <ul style="list-style-type: none"> How to use ICT to engage students with subject content |
| 10 | Project Based Learning and STEM/STEAM <ul style="list-style-type: none"> Incorporating Project Based Learning (PBL) and STEM/STEAM in Stage 4/5 | <ul style="list-style-type: none"> Planning a PBL/STEM/STEAM unit by mapping the syllabus outcomes. |
| 11 | Preparing for Professional Experience <ul style="list-style-type: none"> Becoming a reflective teacher through the feedback cycle Organisational strategies PE1: Building rapport with students and setting classroom expectations | <ul style="list-style-type: none"> Completing myExperience feedback Share resources developed during this course |
| Professional Experience 1 | | |

7. RESOURCES

Textbook details

Each student is required to obtain from the NESA website the following documents: Stage 4/5 Science Syllabus and the Stage 4/5 Support Documents.

Students are not required to purchase Science textbooks for this course. Textbooks will not usually be used during tutorials.

Optional Junior Textbook

- Jenny Zhang, Diane Alford, David McGowan, Craig Tilley (2013) Oxford Insight Science 9 &10 (eBook version)

Additional readings

- Anstey, M. & Bull, G. (2006) *Teaching and learning multiliteracies: Changing times, changing literacies*. Curriculum Press, Melbourne
- Attwood, B. (2005), *Telling the truth about Aboriginal history*. All and Unwin, Crows Nest.
- Bryson, B. (2004) *A Short History of Nearly Everything*, Black Swan, London
- Finger, G., Russell, G., Jamieson-Proctor, R. & Russell, N. (2006) *Transforming Learning with ICT Making IT Happen*. Pearson Australia
- Gibbons, P (2002) *Scaffolding language, scaffolding learning: Teaching second language learners in the mainstream classroom*. Portsmouth, Heinemann
- Hazzard, J. (2004) *The Art of Teaching Science: Inquiry and Innovation in Middle School and High School*
- Henderson, R. (2012). *Teaching Literacies. Pedagogies and Diversity in the Middle Years*, Oxford University Press, Australia
- Hyde, M., Carpenter, L. & Conway, R. (2010). *Diversity and Inclusion in Australian Schools*. Oxford University Press, Australia
- Martin, K. (2008). The intersection of Aboriginal knowledges, Aboriginal literacies and new learning pedagogy for Aboriginal students. In Healy, A (Ed.) *Multiliteracies and diversity in education: New pedagogies for expanding landscapes* pp 59-81. Oxford University Press, Melbourne
- Price, K (2012), *Aboriginal and Torres Strait Islander Education: An Introduction for the Teaching Profession*. Cambridge University Press

Recommended websites

- NESA <http://syllabus.nesa.nsw.edu.au/science/>
- Science Teachers Association of NSW <http://www.stansw.asn.au>
- The Flipped Classroom <http://www.teacherstandards.aitsl.edu.au/illustrations/ViewIOP/IOP00173/index.html>
- Reflections of pre-service teachers, <http://www.ttf.edu.au/psts-talk.html>; this series of video clips shows the reflections of several pre-service teachers each of whom trialed one of the twelve Teaching Teachers for the Future (TTF) Australian Curriculum resource packages with a practicum class. At the end of their lesson the pre-service teachers were invited to reflect on the experience of working with the resource package and adapting it to their class situation. They were also asked to reflect on their understanding of TPACK.
- Student teachers are encouraged to set up their own blog (It is free) at Edublog , <http://edublogs.org/> to create and share resources and lessons they create.

8. ASSESSMENT

| Assessment Task | Length | Weight | Student Learning Outcomes Assessed | Australian Professional Standards Assessed | National Priority Area Elaborations Assessed | Due Date |
|--------------------------------|---------------|--------|------------------------------------|--|--|---|
| Task 1: Lesson plan | c. 2000 words | 40% | 1-5 | 1.1.1, 1.2.1, 1.3.1, 2.1.1, 2.2.1, 2.3.1, 2.5.1, 2.6.1, 3.1.1, 3.3.1, 3.4.1, 3.5.1, 4.4.1, 4.2.1 | A4, 7 C1, 3-5 D1, 3-5, 8-10 F4 | Tuesday 22 nd March 2022 by 5pm |
| Task 2: Unit of work | c. 3000 words | 60% | 1, 2-7 | 1.2.1, 1.3.1, 1.4.1, 1.5.1, 2.1.1, 2.2.1, 2.3.1, 2.4.1, 2.6.1, 3.1.1, 3.2.1, 3.3.1, 3.4.1, 3.5.1, 3.6.1, 5.1.1, 6.3.1 | A2, 5 C6, 10, 12 D11-12, 18-19 E7 F5 | Tuesday 26 th April 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 Task 1: Lesson plan, Stage 4

Plan and design one 60-minute lesson for a mixed-ability Stage 4 class. The lesson plan must follow a standard SED format and be presented using the template provided.

Plan your lesson for a class in a comprehensive high school which would typically include EAL/D students, Indigenous students, and students with various religious and cultural backgrounds. Some students may have low levels of literacy. Differentiation to cater for some students is therefore required. Appropriate differentiation strategies are scaffolding, group work and/or an alternative task or mode of presentation.

1. Write a rationale for your lesson plan. Your rationale should address the questions: What do I want the students to learn? Why is it important? What strategies will I use? What assessment for learning strategies will I use to monitor progress?
2. Prepare the lesson plan to demonstrate how you will use appropriate structure, activities, strategies, and formative assessment in order for your students to develop understanding of the material.

Make sure you:

- choose an appropriate topic for the year group
- support your rationale using references indicating your professional reading
- choose appropriate outcomes and lesson content
- choose an appropriate context
- demonstrate knowledge of effective teaching and learning strategies
- use appropriate format and provide sufficient detail for an effective lesson plan
- include an aspect of literacy/numeracy which integrates with the lesson focus
- provide in full **one** activity (which may be ICT-based)
- express yourself in clear, standard Australian English.

Assessment Task 2: Unit of work, Stage 5

Prepare an outline for a unit of work for a Stage 5 class. The unit of work should cover the first five lessons, which are 80 minutes each; however, you are not preparing full lesson plans.

You must write a rationale for the unit (600-800 words) in which you:

- provide a brief outline of the school and class context
- state precisely what you want the students to learn and why it is important
- describe and justify your choice of context to suit the needs and abilities of this class
- justify your teaching strategies by referring to readings, research and material presented in lectures and the Quality Teaching framework
- demonstrate how differentiation will support a diverse range of learners
- describe the prior knowledge students have to begin this unit and discuss how you would assess and build on this prior knowledge.

The unit outline should be in a standard format that will be explained and investigated during lectures and tutorials. You will receive a **template** for the unit outline which you must use.

Your unit of work must have an embedded context and employ a logically sequenced series of lesson outlines, utilising a **variety of teaching strategies**. There should be potential for student engagement with the material taught –

- syllabus content statements for each lesson
- a description of the activities in each lesson
- one full activity for formative assessment (not an essay)
- one ICT-based activity (not watching a video or PowerPoint presentation)
- one group-work task with a focus on literacy/numeracy (not a mind-map)
- one incursion/excursion/performance/product activity
- outlines only for the other teaching materials required

The assessment task is to be converted to a PDF with the student name in the title of the file and submitted via Moodle.

NB. ALL OUTCOMES AND CONTENT STATEMENTS MUST BE WRITTEN AS FULL STATEMENTS, ACCOMPANIED BY THEIR IDENTIFYING NUMBER.

Any website URLs included in your tasks must be hyperlinked.

UNSW SCHOOL OF EDUCATION
FEEDBACK SHEET
EDST6922 SCIENCE METHOD 1

Student Name:

Student No.:

Assessment Task 1: **Lesson plan, Stage 4**

| SPECIFIC CRITERIA | (-) | —————> | | | (+) |
|--|-----|--------|--|--|-----|
| Understanding of the question or issue and the key concepts involved Rationale for lesson plan addresses the questions: <ul style="list-style-type: none"> • what do I want the students to learn? • why is it important? • what strategies will I use? • what assessment for learning strategies will I use to monitor progress? • rationale supported using references indicating your professional reading | | | | | |
| Depth of analysis and/or critique in response to the task <ul style="list-style-type: none"> • appropriate topic choice for the year group • appropriate choice of outcomes and lesson content • appropriate choice of context • demonstrates knowledge of effective teaching and learning strategies • appropriate selection of student activities • depth of knowledge of the NSW syllabus documents and other relevant curriculum documents • links between syllabus outcomes and the chosen activities evident | | | | | |
| Familiarity with and relevance of professional and/or research literature used to support response <ul style="list-style-type: none"> • reference specifically to material, research and ideas presented in Science method lectures | | | | | |
| Structure and organisation of the response <ul style="list-style-type: none"> • appropriateness of overall structure of response • clarity and coherence of organisation; logical sequence • use of appropriate format | | | | | |
| Presentation of response according to appropriate academic and linguistic conventions <ul style="list-style-type: none"> • clarity, consistency, and appropriateness of conventions for quoting, citing, paraphrasing, attributing sources of information, and listing references (APA style) • clarity and appropriateness of sentence structure, vocabulary use, spelling, punctuation, and word length | | | | | |
| GENERAL COMMENTS | | | | | |

Lecturer:

Date:

Recommended: /20

Grade:

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
EDST6922 SCIENCE METHOD 1

Student Name:

Student No.:

Assessment Task 2: **Unit of work, Stage 5**

| SPECIFIC CRITERIA | (-) ← | → | (+) |
|---|-------|---|-----|
| Understanding of the question or issue and the key concepts involved <ul style="list-style-type: none"> • understanding of the task, including both a rationale and a unit of work | | | |
| Depth of analysis and/or critique in response to the task <ul style="list-style-type: none"> • ability to plan and assess for effective learning by designing lesson sequences using knowledge of the NSW syllabus documents or other curriculum requirements of the Education Act, including a rationale that includes: <ul style="list-style-type: none"> - a brief outline of the school and class context - a statement of what students should learn and why it is important - a description and justification of choice of context - justification of teaching strategies by referring to readings, research and material presented in lectures and the Quality Teaching framework - demonstration of how differentiation will support a diverse range of learners - a description of the prior knowledge students have to begin this unit and discussion of how this prior knowledge will be assessed and built on • design of a unit outline <ul style="list-style-type: none"> - which uses teaching strategies related to the needs and abilities of the class - contains an embedded context - employs a logically sequenced series of lesson outlines, utilising a variety of teaching strategies - has potential for student engagement with the material taught - contains the required lesson activities | | | |
| Familiarity with and relevance of professional and/or research literature used to support response <ul style="list-style-type: none"> • reference specifically to material, research and ideas presented in Science method lectures and from the Professional Experience lectures. | | | |
| Structure and organisation of the response <ul style="list-style-type: none"> • appropriateness of overall structure of response • clarity and coherence of organization; logical sequence • use of appropriate format | | | |
| Presentation of response according to appropriate academic and linguistic conventions <ul style="list-style-type: none"> • contributions are complete and of a standard suitable for use with secondary school students • clarity and appropriateness of sentence structure, vocabulary use, spelling, punctuation, and word length | | | |
| GENERAL COMMENTS | | | |

Lecturer:

Recommended:

/20

Grade:

Date:

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.**