



EDTE434

Science in the Secondary School II

S2 Day 2016

Dept of Education

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General Information

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Credit points

3

Prerequisites

TEP401(S) and (TEP433(P) or EDTE433)

Corequisites

TEP402

Co-badged status

Unit description

This unit builds on TEP433. Curricula, resources and instructional strategies appropriate for the teaching of Biology, Chemistry, Physics, and Earth and Environmental Sciences for Senior Science years 11 and 12 are examined. It is linked to the school experience gained in TEP402.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

Learning Outcomes

On successful completion of this unit, you will be able to:

UO1. a knowledge of the changing policy context of secondary schooling in NSW (Board of Studies, NSWDET) and Australia (ACARA) with specific reference to science;

- UO2 the ability to plan and present lesson sequences based on research data collected during the professional experience (TEP 402);
- UO3 a developing knowledge of both formal and informal assessment procedures in current use in the NSW Stage 6 science syllabus documents;
- UO4 the ability to critique (or reflect on) one's own professional practice with due regard to the input provided by experienced science teacher(s) (TEP402);
- UO5 a working knowledge of the relevant syllabus science documents from both the Board of Studies (NSW) and National Curriculum (ACARA) with specific reference to the final years of secondary schooling;
- UO6 the ability to interpret research findings both in science and science education and relate these where appropriate to current syllabus documents and to the lives of adolescent students;
- UO7 to think critically about the potential of information and communication technologies (ICT) to enhance the quality of learning and teaching to engage adolescent students with science;
- UO8 a developing understanding of key elements of pedagogy including: the strategies needed to cater for the diversity of learners (including specific equity groups), actively engaging adolescent students in learning, classroom management, beginning and ending lessons, integrating a focus on literacy, developing and selecting resources, questioning, and assessment and evaluation.

Assessment Tasks

Name	Weighting	Due
<u>Part A Animations/simulations</u>	10%	5 September
<u>Part B. Science in the media</u>	50%	9 October
<u>Part c Teaching the HSC Option</u>	40%	7 November

Part A Animations/simulations

Due: **5 September**

Weighting: **10%**

Aim:

To develop physics/chemistry/biology/earth and environmental science concepts using computer animations/simulations.

Procedure:

- Use the internet to find an animation/simulation that could be used to develop an physics/chemistry/biology/earth and environmental science concept from the Preliminary or HSC course.
- Identify the learning object by stating its URL.
- Identify the syllabus dot point(s) or skill(s) that this learning object could develop.
- Provide a rationale for your choice of this resource and evaluate its effectiveness at developing the chosen concept.
- Design a computer-based activity that uses the learning object to develop the selected syllabus dot point and skill (Reflect your own teaching experiences).

On successful completion you will be able to:

- UO1. a knowledge of the changing policy context of secondary schooling in NSW (Board of Studies, NSWDET) and Australia (ACARA) with specific reference to science;
- UO4 the ability to critique (or reflect on) one's own professional practice with due regard to the input provided by experienced science teacher(s) (TEP402);
- UO5 a working knowledge of the relevant syllabus science documents from both the Board of Studies (NSW) and National Curriculum (ACARA) with specific reference to the final years of secondary schooling;
- UO7 to think critically about the potential of information and communication technologies (ICT) to enhance the quality of learning and teaching to engage adolescent students with science;
- UO8 a developing understanding of key elements of pedagogy including: the strategies needed to cater for the diversity of learners (including specific equity groups), actively engaging adolescent students in learning, classroom management, beginning and ending lessons, integrating a focus on literacy, developing and selecting resources, questioning, and assessment and evaluation.

Part B. Science in the media

Due: **9 October**

Weighting: **50%**

Two 25% Part B assignments: one in the same option as Part A and the other in an option of your own choice; and 40% Part C in one option. For example, students might complete Parts A, B and C (75%) in the Chemistry option and only Part B (25%) in the Biology option.

Aim:

The purpose of this assignment is for you to consider media reports of recent science breakthroughs and their place within the Stage 6 syllabus. This assignment is an opportunity to develop the skill of interpreting research findings in science to relate them to the lives of adolescents.

Procedure:

- Select what you consider to be a recent breakthrough in biological research, gathering information, preferably Australian, about your selected topic from any or all of the following – research organizations, internet, relevant government departments, media websites, registered charities or reputable private agencies. State your rationale for the choice of this topic and comment on its potential impact on future biological research, the environment and society.
- Develop one eighty-minute lesson for this topic suitable for either the Preliminary or HSC course. Use the science lesson pro forma as your guide to the components of a science lesson. Given that many science breakthroughs use ICT as a communication tool, it is suggested that you make use of, for example, the interactive whiteboard, podcasts, PowerPoint presentations, animations etc. in your lesson.
- Develop Teacher Notes for the lesson incorporating information about the teaching of the science topic. Your Teacher notes may include: how and where the topic extends both the boundaries of the syllabus and challenges students' thinking, suggested assessment strategies for students of different achievement levels, tips for conducting a successful lesson such as how to manage potential learning problems, e.g. persistence of student misconceptions.
- References for both science education and science are required. Literature from science education might include dealing with controversial issues and the importance of science literacy for all students. Literature from science might include journals such as Nature or from popular science writings such as New Scientist. Don't forget to use the APA style.

This lesson should be ready to share with your colleagues (Reflect your own teaching experience when you design activities).

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to the input provided by experienced science teacher(s) (TEP402);

- UO5 a working knowledge of the relevant syllabus science documents from both the Board of Studies (NSW) and National Curriculum (ACARA) with specific reference to the final years of secondary schooling;
- UO8 a developing understanding of key elements of pedagogy including: the strategies needed to cater for the diversity of learners (including specific equity groups), actively engaging adolescent students in learning, classroom management, beginning and ending lessons, integrating a focus on literacy, developing and selecting resources, questioning, and assessment and evaluation.

Part c Teaching the HSC Option

Due: **7 November**

Weighting: **40%**

Aim:

The purpose of this assignment is for you to become familiar with one of the HSC options.

(i) Programming and Practical (30%)

Choose one option from the Stage 6 HSC syllabus (Physics/Chemistry/Biology/EES). Your Head Teacher has given you a Year 12 class for 2017. Your task is to prepare part of a teaching program for a HSC option of your choice for the next science staff meeting at school. Prepare your part of the teaching program by completing the following tasks..

Develop two practical activities (each of eighty minutes duration) for use with students. These activities may involve for example data loggers, Internet – websites, animations/simulations, podcasts, stations approach or whole class activities involving all students. One activity must include the use of ICT in an instructive/innovative manner not simply looking up/reading websites. For each activity make sure you include the following in your lesson preparation:

- Identify and link HSC syllabus outcomes and skills to your activities
- Learning outcomes for each activity linked to assessment strategies
- Teaching/learning activities that engage the full spectrum of senior students
- Description of each practical activity with equipment, procedure and worksheet
- Teacher notes about conducting each practical activity with a recommended sequence for the activities within the unit
- Three HSC questions - one question set at Performance Band 2, one at Performance Band 4 and one at Performance Band 6. Provide model answers and a marking scheme for each question. Marks will be awarded for novelty of approach. (Consult previous HSC

exams and reports from the marking centre at the Board of Studies website). Multiple-choice questions are not asked in the electives.

- List three relevant Internet sites for this option and comment on their usefulness (4-5 sentences). For example, how does the website meet some of the objectives and outcomes of this option compared with other resources such as texts and worksheets.

(ii) Presentation - during workshop time (10%)

Time allowed: 15 minutes

Your task is to choose and conduct a practical activity that will capture student interest and develop student understanding of a particular idea or concept in your chosen option.

Your activity should include a short PowerPoint presentation of the concepts being developed.

At the end of the demonstration you will need to give each student in the workshop a one A4 page summary about your demonstration. This should also include a risk assessment.

On successful completion you will be able to:

- UO1. a knowledge of the changing policy context of secondary schooling in NSW (Board of Studies, NSWDET) and Australia (ACARA) with specific reference to science;
- UO2 the ability to plan and present lesson sequences based on research data collected during the professional experience (TEP 402);
- UO3 a developing knowledge of both formal and informal assessment procedures in current use in the NSW Stage 6 science syllabus documents;
- UO5 a working knowledge of the relevant syllabus science documents from both the Board of Studies (NSW) and National Curriculum (ACARA) with specific reference to the final years of secondary schooling;
- UO6 the ability to interpret research findings both in science and science education and relate these where appropriate to current syllabus documents and to the lives of adolescent students;
- UO7 to think critically about the potential of information and communication technologies (ICT) to enhance the quality of learning and teaching to engage adolescent students with science;
- UO8 a developing understanding of key elements of pedagogy including: the strategies needed to cater for the diversity of learners (including specific equity groups), actively engaging adolescent students in learning, classroom management, beginning and ending lessons, integrating a focus on literacy, developing and selecting resources, questioning, and assessment and evaluation.

Delivery and Resources

Resources:

BOSTES: This is the general site for the Board of Studies and contains useful links to most science areas.

<http://www.boardofstudies.nsw.edu.au>

The ARC page on the BOSTES website

<http://arc.bostes.nsw.edu.au/>

ROSA information from the BOSTES website

<http://www.boardofstudies.nsw.edu.au/rosa/grades/>

ACARA: This site is the draft National Curriculum for Biology <http://www.australiancurriculum.edu.au/SeniorSecondary/Science/Biology/RationaleAims>

Uniserve Science (University of Sydney) This site contains teaching programs for each of the preliminary units and some HSC units.

<http://science.uniserve.edu.au/school/curric/stage6/biol/>

Australian Academy of Science. This site contain up-to-date research and information for preliminary and some HSC units.(Nova: Science for curious minds)

<http://www.nova.org.au/>

HSC teaching materials:

<https://hscstudylab.com.au/teachers>

(Stage 6 Biology, Chemistry and Physics – log in details will be provided)

http://www.boardofstudies.nsw.edu.au/syllabus_hsc/pdf_doc/chemistry_stg6_syl.doc

Stage 6 Support Document (2007)

http://www.boardofstudies.nsw.edu.au/syllabus_hsc/pdf_doc/science_revised_support.pdf

Web Elements

<http://www.webelements.com/>

Chemistry Experiment Simulations, Tutorials and Conceptual Computer Animations

<http://www.chem.iastate.edu/group/Greenbowe/sections/projectfolder/animationsindex.htm>

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](#). Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

New Assessment Policy in effect from Session 2 2016 http://mq.edu.au/policy/docs/assessment/policy_2016.html. For more information visit http://students.mq.edu.au/events/2016/07/19/new_assessment_policy_in_place_from_session_2/

Assessment Policy prior to Session 2 2016 <http://mq.edu.au/policy/docs/assessment/policy.html>

Grading Policy prior to Session 2 2016 <http://mq.edu.au/policy/docs/grading/policy.html>

Grade Appeal Policy <http://mq.edu.au/policy/docs/gradeappeal/policy.html>

Complaint Management Procedure for Students and Members of the Public http://www.mq.edu.au/policy/docs/complaint_management/procedure.html

Disruption to Studies Policy http://www.mq.edu.au/policy/docs/disruption_studies/policy.html *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

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

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/support/student_conduct/

Results

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit ask.mq.edu.au.

Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)

- [Ask a Learning Adviser](#)

Student Services and Support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Learning outcomes

- UO1. a knowledge of the changing policy context of secondary schooling in NSW (Board of Studies, NSWDET) and Australia (ACARA) with specific reference to science;
- UO2 the ability to plan and present lesson sequences based on research data collected during the professional experience (TEP 402);
- UO3 a developing knowledge of both formal and informal assessment procedures in current use in the NSW Stage 6 science syllabus documents;
- UO6 the ability to interpret research findings both in science and science education and relate these where appropriate to current syllabus documents and to the lives of adolescent students;
- UO7 to think critically about the potential of information and communication technologies (ICT) to enhance the quality of learning and teaching to engage adolescent students with science;

Assessment task

- Part c Teaching the HSC Option

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 outcome

- UO4 the ability to critique (or reflect on) one's own professional practice with due regard to the input provided by experienced science teacher(s) (TEP402);

Assessment task

- Part c Teaching the HSC Option

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

- UO2 the ability to plan and present lesson sequences based on research data collected during the professional experience (TEP 402);
- UO3 a developing knowledge of both formal and informal assessment procedures in current use in the NSW Stage 6 science syllabus documents;
- UO4 the ability to critique (or reflect on) one's own professional practice with due regard to the input provided by experienced science teacher(s) (TEP402);
- UO5 a working knowledge of the relevant syllabus science documents from both the Board of Studies (NSW) and National Curriculum (ACARA) with specific reference to the final years of secondary schooling;
- UO6 the ability to interpret research findings both in science and science education and relate these where appropriate to current syllabus documents and to the lives of adolescent students;
- UO7 to think critically about the potential of information and communication technologies (ICT) to enhance the quality of learning and teaching to engage adolescent students with

science;

- UO8 a developing understanding of key elements of pedagogy including: the strategies needed to cater for the diversity of learners (including specific equity groups), actively engaging adolescent students in learning, classroom management, beginning and ending lessons, integrating a focus on literacy, developing and selecting resources, questioning, and assessment and evaluation.

Assessment tasks

- Part A Animations/simulations
- Part B. Science in the media
- Part c Teaching the HSC Option

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

- UO1. a knowledge of the changing policy context of secondary schooling in NSW (Board of Studies, NSWDET) and Australia (ACARA) with specific reference to science;
- UO2 the ability to plan and present lesson sequences based on research data collected during the professional experience (TEP 402);
- UO3 a developing knowledge of both formal and informal assessment procedures in current use in the NSW Stage 6 science syllabus documents;
- UO5 a working knowledge of the relevant syllabus science documents from both the Board of Studies (NSW) and National Curriculum (ACARA) with specific reference to the final years of secondary schooling;
- UO6 the ability to interpret research findings both in science and science education and relate these where appropriate to current syllabus documents and to the lives of adolescent students;
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Assessment tasks

- Part A Animations/simulations
- Part B. Science in the media
- Part c Teaching the HSC Option

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

- UO1. a knowledge of the changing policy context of secondary schooling in NSW (Board of Studies, NSWDET) and Australia (ACARA) with specific reference to science;
- UO3 a developing knowledge of both formal and informal assessment procedures in current use in the NSW Stage 6 science syllabus documents;
- UO5 a working knowledge of the relevant syllabus science documents from both the Board of Studies (NSW) and National Curriculum (ACARA) with specific reference to the final years of secondary schooling;
- UO6 the ability to interpret research findings both in science and science education and relate these where appropriate to current syllabus documents and to the lives of adolescent students;
- UO7 to think critically about the potential of information and communication technologies (ICT) to enhance the quality of learning and teaching to engage adolescent students with science;
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Assessment tasks

- Part B. Science in the media
- Part c Teaching the HSC Option

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

- UO1. a knowledge of the changing policy context of secondary schooling in NSW (Board of Studies, NSWDET) and Australia (ACARA) with specific reference to science;
- UO2 the ability to plan and present lesson sequences based on research data collected during the professional experience (TEP 402);
- UO3 a developing knowledge of both formal and informal assessment procedures in current use in the NSW Stage 6 science syllabus documents;
- UO5 a working knowledge of the relevant syllabus science documents from both the Board of Studies (NSW) and National Curriculum (ACARA) with specific reference to the final years of secondary schooling;
- UO6 the ability to interpret research findings both in science and science education and relate these where appropriate to current syllabus documents and to the lives of adolescent students;
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Assessment tasks

- Part A Animations/simulations
- Part B. Science in the media

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcomes

- UO1. a knowledge of the changing policy context of secondary schooling in NSW (Board of Studies, NSWDET) and Australia (ACARA) with specific reference to science;
- UO2 the ability to plan and present lesson sequences based on research data collected during the professional experience (TEP 402);
- UO3 a developing knowledge of both formal and informal assessment procedures in current use in the NSW Stage 6 science syllabus documents;
- UO6 the ability to interpret research findings both in science and science education and relate these where appropriate to current syllabus documents and to the lives of adolescent students;

Assessment tasks

- Part B. Science in the media
- Part c Teaching the HSC Option