

EDUC3052: Specialist Studies in Science 2

Callaghan

Semester 1 - 2024



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

OVERVIEW

Course Description This course will develop students' pedagogical understanding of programming and assessment procedures suitable for use within the science Key Learning Area. It will consider the rationales of the Stage 6 science syllabi, program design and development of assessment strategies suitable for work appropriate to a NSW syllabus, drawing on their science major.

Requisites Enrolment in this course is dependent on meeting the teacher education admission milestone of successful completion of

- Three HSC band 5s (including one in English) or
- 80 units of UoN courses or
- Regulatory authority approved comparable pathways or
- Commencement in the program pre 2016

Assumed Knowledge EDUC1101 and EDUC2052

Contact Hours

Lecture
Face to Face On Campus
8 hour(s) per Term Full Term

Tutorial
Face to Face On Campus
16 hour(s) per Term Full Term

Field Study
Face to Face *Off Campus*
6 hour(s) per Term Full Term
Field work, one day off campus (Saturday)

Unit Weighting 10

Workload Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.

COURSE OUTLINE

CONTACTS

Course Coordinator	Callaghan Mr Andrew Walker Andrew.Walker@newcastle.edu.au Consultation: via email or canvas
Teaching Staff	Other teaching staff will be advised on the course canvas site.
School Office	School of Education VG30 V Building Callaghan Education@newcastle.edu.au +61 2 4921 6428

SYLLABUS

Course Content	<ul style="list-style-type: none">• Patterns and principles of assessment in NSW Science courses• Impact of changing national policies on NSW assessment practice• Deep understanding of principles of standards-based assessment• Integration of coherent assessment principles into unit design and programming
Course Learning Outcomes	<p>On successful completion of this course, students will be able to:</p> <ol style="list-style-type: none">1. Develop science lesson plans and programs for their discipline major at the Stage 6 level of the 7-12 curriculum;2. Demonstrate integration of aims, objectives, content, outcomes and banded statements of learner achievement;3. Use a range of strategies, technologies and resources for teaching their discipline major;4. Apply their understanding of key assessment issues to the preparation of a specific Stage 6 assessment task relevant to their science major; and5. Use the educational literature to defend practice within current Board of Studies parameters.
Course Materials	<p>Recommended Reading:</p> <p>Aydeniz, M. & Southerland, S.A. (2012). A national survey of middle and high school science teachers' responses to standardized testing: Is science being devalued in schools? <i>Journal of Science Teacher Education</i>, 23, 233-257.</p> <p>Stobart, G. (2008). Removing obstacles to fairness. <i>Assessment in Education</i>, 15(2), 121-122.</p> <p>Suto, W.M.I. & Nadas, R. (2009). Why are some GSCE examination questions harder to mark accurately than others? Using Kelly's Repertory Grid technique to identify relevant question features. <i>Research Papers in Education</i>. 24(3), 335-377.</p> <p>Tandrow, P.A., Tan, A.L., Yung, B.H. & Cohen, L. (2009). Science teachers' professional development and changes in science practical assessment practices: What are the issues? <i>Research in Science Education</i>. On-line: DOI 10.1007/s11165-008-9103-z.</p> <p>Tognolini, J., & Stanley, G. (2007). Standards-based assessment – a tool and means to the development of human capital and capacity building in education, <i>Australian Journal of Education</i>, 1(2), 129-145.</p> <p>Tomas, L., & Ritchie, S.M. (2015). The challenge of evaluating students' scientific literacy in a writing-to-learn context, <i>Research in Science Education</i>, 45, 41-58.</p>

Recommended Text:

Killen, R. (2016). *Effective teaching strategies: Lessons from research and practice* (7 Edition). South Melbourne: Cengage

NESA. (latest available). *NSW Syllabus for the Australian curriculum: Science K-10 (incorporating Science and Technology K-6) syllabus*. North Sydney: NSW Educational Standards and Assessment Authority.

NESA. (latest available). *Chemistry or Physics or Biology or Earth and Environmental Science or Investigating Science Stage 6 syllabus*. North Sydney: NSW Educational Standards and Assessment Authority.

SCHEDULE

Week	Week Begins	Topic	Learning Activity	Assessment Due
1	26 Feb	Stage 6 - What to teach? Teaching the dot-points and their lesson plans	Syllabus use: what do the verbs mean?, which lesson plan format?	
2	4 Mar	How do you assess their ability? Standards based assessment	Practical activity creating a Standards-based marking rubric that includes literacy and numeracy evaluation	
3	11 Mar	Other ways to assess student ability. Analytical based assessment	Practical activity creating an Analytical marking rubric and a hybrid scheme	
4	18 Mar	What are you going to assess and when? Schedules and sequences	Practical activity completing an Assessment Schedule and creating a course Scope and Sequence	
5	25 Mar	Designing a Practical Assessment Task: Verbs, sections, skills	Design of a Practical Assessment Task with focus on verbs and skills that follow NSW Science curriculum guidelines	
6	1 April	Marking a Practical Assessment Task rubric aligned to Outcomes	Design of a Practical Assessment Task marking rubric that aligns with the order of the task outline given to students	
7	8 Apr	How to give students Notice of their Assessment? What a Notice must have	Design of a Notice of Assessment form for the Practical Task with all relevant NESA requirements	Task 1 (Program & Lesson plans with assessment) due Friday Week 7, 11.30pm
Mid Term Break				
Mid Term Break				
8	29 Apr	How to report on student assessment: Reports and interviews	Analysing and writing a student report with explanation as part of a mock carer interview	Task 2 Fieldwork in School lab: Student demonstration of resource(s) On Saturday 9am– 4pm
9	6 May			
10	13 May			Task 3 (Assessment Task design) due Friday Week 10, 11.30pm
11	20 May			
12	27 May			
13	3 June			
Examination Period				
Examination Period				

ASSESSMENTS

This course has three assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Lesson Plans with Assessment	Task 1 Friday Week 7	Individual	40%	1, 2, 3, 4
2	Fieldwork	Saturday Week 8	Individual	20%	3
3	Assessment Task Design	Task 2 Friday Week 10	Individual	40%	1, 2, 3, 4, 5

Late Submissions The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

Assessment 1 - Unit Plan

Assessment Type Proposal / Plan

Purpose Students will be able to plan coherent science lessons that integrate objectives, content, outcomes and banded standards of achievement

Description Documented science lesson plans: outcome-based and standards-scaffolded. Lessons include a literacy and numeracy component with assessment by standards-based task, followed by analytical assessment task, and an appropriate resource list.

- Task 1 (40%) Program of four lessons and assessment with explanation of the Inquiry Question objectives
- a. a Program outline with the Inquiry Question, Outcome(s), lessons and registration
 - b. a different Outcome-based and scaffolded lesson plan for each dot-point provided
 - c. assessment task/activity with a marking rubric for each lesson (2 standards, 2 analytical)
 - d. justification for your use of standards-based and analytic marking rubrics by referring to literature
 - e. an explicit description of how literacy and numeracy have been evaluated in each lesson
 - f. an outline of how feedback can be provided to students
 - g. Module title for this syllabus Inquiry Question and a description of its objective

Weighting 40%

Length 2000 words (indicative)

Due Date Task 1 Friday Week 7

Submission Method Online – as specified by your tutor

Assessment Criteria See ASSESSMENT GUIDELINES at the end of this document

Return Method Online

Feedback Provided Online

Assessment 2 – Student resource demonstration

Assessment Type	Fieldwork observation
Purpose	Students will observe and record essential demonstrations to teach Stages 5 Science using a range of technologies and resources
Description	Observation of essential demonstrations to teach Stages 4 and 5 Science and assessment of student annotations for using those resources.
Weighting	20%
Demonstration	Notes taken on 20 (indicative) essential demonstrations by tutor
Due Date	Saturday 9:00 am – 4:00 pm, Week 8
Submission Method	Face to face – as directed by tutor
Assessment Criteria	In order to achieve a pass, you are required to: a. Participate in Fieldwork: demonstrations of a range of technologies and resources b. Observe demonstrations outlined in NSW Science syllabus for Stage 5 classes c. Provide written connections for technology and resources to the Stage 5 syllabus Explain demonstration using Science metalanguage d. Provide informed responses during and on conclusion of demonstration
Return Method	Written feedback on conclusion of demonstration
Feedback Provided	By tutor

Assessment 3 - Essay

Assessment Type	Essay
Purpose	Students will be able to apply their understanding of NESA approved assessment methods to prepare an assessment task for their science major.
Description	Practical Assessment Task design to assess and report the standard of student ability. An analytical-based marking rubric and Notice of Assessment indicating the Outcomes assessed. Justification for design of the Task and resources by referring to literature.
Weighting	40%
Length	2000 words max.
Due Date	Friday Week 10
Submission Method	Online – submit as required by your tutor
Assessment Criteria	You are required to: 1 Design a practical activity from the Stage 6 syllabus associated with your science major, which would form a part of your HSC assessment scheme. Write the worksheet so it is ready for students to follow, complete the activity and report their work. 2 Prepare and the marking sheet (containing outcome list and analytical marking rubric) which you would distribute to students and use to assess their performance on your specified task. Justify your use of this type of scheme 3 Prepare a Notice of Assessment sheet (containing outcome list) that would inform students of task requirements and justify when and why you would distribute it.
Return Method	Online
Feedback Provided	Online

ADDITIONAL INFORMATION

Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction (D)	Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

*Skills are those identified for the purposes of assessment task(s).

Communication Methods

Communication methods used in this course include:

- canvas Course Site: students will receive communications via the posting of content or announcements on the canvas course site.
- Face to Face: communication will be provided via face to face meetings or supervision.

Course Evaluation

Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.

Oral Interviews (Vivas)

As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the [Oral Examination \(viva\) Procedure](#). In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the [Student Conduct Rule](#).

Academic Misconduct

All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in all locations. Please see the [Student Academic Integrity Policy](#) for more information.

Adverse Circumstances

The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s).

Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where:

1. the assessment item is a major assessment item; or
2. the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system;
3. you are requesting a change of placement; or
4. the course has a compulsory attendance requirement.

Before applying you must refer to the [Adverse Circumstance Affecting Assessment Items Procedure](#) available at:

Important Policy Information

The 'HELP for Students' tab in UoNline contains important information that all students should be familiar with, including various systems, [policies and procedures](#).

This course outline was approved by the Head of School. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.

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Assignment 1: Lesson Plans with standards-based and analytical assessment

Weighting 40% (2000 words due Fri Week 7)

A standards-based marking rubric will be used to mark your work. You will also be using standards-based assessment as well as analytical assessment.

The first two lessons you design will include how you provide standards-based feedback on student ability. The second two lessons you design will include how you provide analytical feedback on student ability. Each of your four lessons must cover one dot-point from the Stage 6 Investigating Science syllabus Inquiry Question 2 supplied.

Inquiry question: *What are the differences and similarities between scientific theories and laws?*

Students:

(Lessons 1 and 2: with standards-based assessment)

- *collect primary data to investigate the law of conservation of mass*
- *collect secondary-sourced data to investigate the theory of plate tectonics*

Students:

(Lessons 3 and 4: with analytical assessment)

- *gather secondary-sourced data to investigate and assess the evidence that supports scientific laws, using:*
 - *Mendel's Law of Dominance*
- *design and collect primary data to show that results can be predicted by laws, using:*
 - *Ohm's Law*

Task Details	Assessment Criteria
<p>Outcome-based units of work are how science teaching is programmed in New South Wales. Student achievement is reported using these syllabus Outcomes.</p> <p>Student performance is assessed against pre-determined Standards. These Standards contain criteria that describe pupil ability in detail.</p> <p>Standards-based and analytical assessment describes how student performance is determined in New South Wales in accordance with NESA guidelines.</p> <p>Teacher planning and the Content dot-points covered in class should be reflected in the student Outcomes that are assessed.</p> <p>Your assignment will be evaluated using a standards-based marking scheme.</p>	<p>You are required to submit:</p> <ol style="list-style-type: none"> a. a Program outline with the Inquiry Question, Outcome(s), lessons and registration b. a different Outcome-based and scaffolded lesson plan for each dot-point <u>provided</u> c. assessment task/activity with a marking rubric for each lesson (2 standards, 2 analytical) d. justification for your use of standards-based and analytic marking rubrics by referring to literature (4 sources, 200 words max.) e. Module title for this syllabus Inquiry Question and a description of its objective (100 words max.) f. an explicit description of how literacy and numeracy have been evaluated in each lesson (200 words max.) g. an outline of how feedback can be provided to students (100 words max.) h. references for all resources used

Criteria	6	5	4	3	2	1	0
Program with Outcome(s), lessons and registration	Structured Program with Outcomes, Assessment, Content, lesson sequence and registration	Program structure, Outcomes, Assessment, Content, lesson sequence or registration missing	Program has structure with any 2 elements missing	Program has structure, Outcomes or Assessment, and a lesson sequence shown	Program is outlined and has a lesson sequence shown	Attempt at a Program and/or lesson sequence shown	No Program or lesson sequence shown
Lesson plans linked to Outcomes	4 Highly engaging lesson plans, linked to Outcomes and explicitly covering the dot-points provided.	4 effective lesson plans, linked to Outcomes and explicitly covering the dot-points provided.	4 Outcome-based, effective lessons covering most of the dot-points provided	4 scaffolded lessons connected with the dot-points provided	Less than 4 scaffolded lessons connected with the dot-points provided	Activities with limited cover of the dot-points provided	No lessons shown
Standards-based rubrics	Highly effective standards-based assessment rubrics for both lessons	Effective standards-based assessment rubrics for both lesson	Standards-based assessment rubrics for each lesson, only one effective	Standards-based assessment for each lesson	Standards-based assessment for one lesson	Standards-based assessment limited	Absence of any standards-based rubric
Analytical rubrics	Highly effective analytical assessment rubrics for both lessons	Effective analytical assessment rubrics for both lesson	Analytical assessment rubrics for each lesson, only one effective	Analytical assessment for each lesson	Analytical assessment for one lesson	Analytical assessment limited	Absence of any analytical rubric
Justification for use of rubrics with educational literature	The use of standards-based AND analytic marking rubrics justified with educational literature	The use of standards-based or analytic marking rubrics justified with educational literature	The use of standards-based AND analytic marking rubrics described by referring to literature	The use of standards-based or analytic marking rubrics described by referring to literature	The use of standards-based and analytic marking rubrics described without reference	The use of standards-based or analytic marking rubrics described without reference	Absence of justification for rubrics used
Description of literacy and numeracy	Explicit description of literacy and numeracy evaluation for each lesson with additional feedback	Literacy and numeracy evaluation for each lesson and additional feedback described	Literacy and numeracy evaluation for less than 4 lessons or feedback not described	General literacy and numeracy description and feedback described	1 of literacy or numeracy or feedback not described	Literacy or numeracy or feedback described only	Literacy, numeracy, feedback not described
Module title description and sources correctly cited			Module title described and useful references complete	Module title outlined and useful references complete	Module title outlined or useful references incomplete	Module title outline or reference list not shown	Absence of Module title outline or sources list

Mark guide: Fail: <20 Pass: 20 – 25 Credit: 26 – 29 Distinction: 30 – 35 High Distinction: 36 - 40

Assignment 2: Practical demonstration

Weighting: 20% (Fieldwork: Saturday, Week 8)

In the school laboratory you will be shown demonstrations of equipment required to cover the NSW Stage 5 Science syllabus content. As you observe the demonstrations you are required to take notes and report on all stations at the end of the session.

Task details: You will report on the Science content of each demonstration and its equipment. Feedback will be provided after the session verbally and online. For each station you will be assessed on your ability to show: syllabus connection, content metalanguage and the pedagogy used for communication and explanation of the equipment.

Mark guide: Fail: <10 Pass: 10 – 12 Credit: 13 – 14 Distinction: 15 – 17 High Distinction: 18 - 20

Standard	<i>Highly competent (18-20)</i>	<i>Competent (15 - 17)</i>	<i>Limited Competence (13 - 14)</i>	<i>Very limited Competence (10 - 12)</i>	<i>Not demonstrated (0 - 9)</i>
Reporting	Identifies Syllabus Strand, at least 2 metalanguage examples, an engaging question and practical details for all stations	Identifies Syllabus Strand, 2 metalanguage examples, an engaging question and practical details for most stations	Identifies Syllabus Strand, a metalanguage example and/or question with practical details for most stations	Inconsistent reporting of the Syllabus Strand, a metalanguage example, question and practical details for most stations	Syllabus Strand, metalanguage and feedback question missing
Total /20					

Assignment 3: Standards referenced practical assessment task

Weighting 40% (2000 words due: Week 10)

You are to produce an *analytical* based Assessment Task. The Practical Assessment Task you design will assess the standard of student ability and report on the dot-point section provided. An analytical-based marking rubric will be included with your task. Your Notice of Assessment will show the Outcomes assessed. An analytical-based marking rubric will be used to mark your work.

Your Practical Assessment Task will assess both of these dot-points from the Stage 6 Investigating Science syllabus. You are to assess only one of the four investigations listed.

Inquiry question: *What inferences can be drawn from observations?*

Students:

- *conduct an investigation and collect a range of qualitative and quantitative primary data from one of the following:*
 - *growth of plants (biology)*
 - *reactions of calcium carbonate (chemistry)*
 - *the 'life' of different batteries under different circumstances (physics)*
 - *water quality of a pond or local stream (earth & environmental science)*
- *make inferences and conclusions derived from the primary data collected in this practical investigation*

Provide for this Task:

- a. a practical activity from the Stage 6 syllabus dot-point associated with your Science major
- b. a worksheet ready for students to follow when completing the activity and reporting their work. As this Task may be used as a Depth Study, use the sections from the Working Scientifically Outcomes: Questioning & Predicting, Communicating - plus 2 others - AND a Knowledge & Understanding. About 5 hours student work in total.
- c. a marking sheet (containing Outcome list and analytical marking rubric) which you would distribute to students
- d. a justification for your use of an analytic marking rubric by referring to literature (2 sources, 100 words max.)
- e. a Notice of Assessment sheet (containing Outcome list) that would inform students of Task requirements
- f. the justification for when and why you would distribute a Notice of Assessment. (100 words max.)

Assignment Component	Mark Range	Score
a. Task is a primary investigation appropriate for Stage 6 standard	0-3	
a. Task allows for qualitative and quantitative data to be collected	0-2	
a. Task allows for inferences and conclusions made from data	0-2	
a. Task assesses dot-points explicitly	0-3	
b. Worksheet has a logical flow and explicit instructions	0-3	
b. Worksheet guides student reporting comprehensively	0-2	
b. Worksheet is sectioned and clearly shows marks awarded	0-3	
b. Worksheet shows Outcomes assessed	0-2	
c. Marking rubric is sectioned and clearly shows marks awarded	0-3	
c. Marking rubric correlates obviously with worksheet	0-2	
c. Marking rubric shows Outcomes and is analytical/hybrid	0-2	
d. Justification for your use of an analytic marking rubric	0-3	
d. Justification of an analytic marking rubric correctly referenced	0-2	
e. Notice of Assessment with Outcomes and in ordered format	0-3	
e. Notice of Assessment with explicit student requirements	0-2	
f. Justification for your issue of Notice of Assessment	0-3	
TOTAL	0-40	

Mark guide: Fail: <20 Pass: 20 – 25 Credit: 26 – 29 Distinction: 30 – 35 High Distinction: 36 - 40