



# Sample Scope and Sequence

Transdisciplinary Science, TDS315123

## Scope and sequence

Below is a possible sequence of content for Transdisciplinary Science, TDS315123. This example supports teachers to develop their own scope and sequence documents to meet the needs of learners.

Work requirements have been identified within this possible sequence of content. Providers must ensure there are sufficient opportunities for learners to demonstrate improvement over time and/or consistency of achievement against each criterion.

This sample scope and sequence must be adapted by schools in order to meet the Office of TASC's [Standards for Providers](#)<sup>1</sup> including ensuring that internal assessments are fair, equitable and comparable.

Providers can use the [Assessment Documentation: Self-Evaluation Toolkit for Teachers](#)<sup>2</sup> to check their plans for assessment, assessment tools and assessment records.

The Office of TASC have specific advice and requirements for the development of school-based scope and sequence documents. Please visit the [TASC website](#)<sup>3</sup> for more information.

## Context statement

This scope and sequence was developed for a class of 20-25 learners in a 7-12 secondary college environment. Learners participate in 3 x 90-minute lessons per week. Learners have access to a device at school. The school has access to a local patch of remnant eucalypt community, along with river, agriculture, marine environments.

## Course specific advice

Using water as a unifying theme is only one example for delivering this course. This document is part of a set of baseline resources to support teachers to implement Transdisciplinary Science, TDS315123. When developing their own scope and sequence, teachers should view the accredited [Course Document](#)<sup>4</sup> and [Course Implementation Guide](#)<sup>5</sup>. A Community of Practice exists for this course, please visit our [website](#)<sup>6</sup> for more information.

<sup>1</sup> <https://www.tasc.tas.gov.au/providers/quality-assurance/standards-for-providers/>

<sup>2</sup> [https://www.tasc.tas.gov.au/wp-content/uploads/2022/06/SelfEvaluation\\_AssessmentDocumentation.pdf](https://www.tasc.tas.gov.au/wp-content/uploads/2022/06/SelfEvaluation_AssessmentDocumentation.pdf)

<sup>3</sup> <https://www.tasc.tas.gov.au/>

<sup>4</sup> <https://www.tasc.tas.gov.au/students/courses/science/>

<sup>5</sup> <https://1land12.education.tas.gov.au/learning-areas/science/>

<sup>6</sup> <https://1land12.education.tas.gov.au/communities-of-practice/>

Time / Module	Mapping to course content	Example learning activity	Assessment Task	Relative Weighting	Work Requirement	Criterion	Criterion Elements
Term 1 - Week 1 Module 1 - Research, trial and plan	Research, Trial and Plan. Research. Introduction, Expectations and Engage in the Problem.	<ul style="list-style-type: none"> <li>Acknowledgment of Country</li> <li>class agreements</li> <li>outline of scope and sequence and 3 x modules</li> <li>outline the inquiry approval procedures for learners (see course document appendix 7)</li> <li>provide detailed module learner guide with assessment requirements for learners</li> <li>provide logbook task to learners</li> <li>establish structure of logbook</li> <li>define <a href="#">transdisciplinary</a><sup>7</sup> and consider the transdisciplinary nature of science (see course document, pp.40)</li> <li>identify problems that could be addressed by science and the <a href="#">United Nations Sustainable Development Goals</a><sup>8</sup> <ul style="list-style-type: none"> <li>» Watch this <a href="#">United Nations video</a><sup>9</sup> explaining solutions to poverty, inequality, injustice and climate change.</li> </ul> </li> </ul> <p>Consider water – ‘a resource and a threat’ as concept that crosses over many Sustainable Development Goals:</p> <ul style="list-style-type: none"> <li>(6) clean water and sanitation</li> <li>(7) affordable and clean energy</li> <li>(11) make cities and human settlements inclusive, safe, resilient, and sustainable</li> <li>(13) climate action</li> <li>(14) life below water</li> <li>(15) life on land</li> <li>and possibly others.</li> </ul> <p>Explain the interrelationships between systems components by creating a concept map about water, its links to Sustainable Development Goals and learning areas of physics, chemistry, biology and earth and space sciences.</p>	<b>Module 1 - Work Requirement 1 of 2</b> <b>Title of work requirement:</b> Logbook <b>Mode or format:</b> investigation See the course document for more information.	Minor	Yes	C1 C2 C3 C4 C5	All All All All All
Term 1 - Week 2	Research, Trial and Plan.	<ul style="list-style-type: none"> <li>Unpack teamwork skills and generate agreements and ways of working in teams.</li> </ul>	<b>Module 1 - Work Requirement 1 of 2</b>	Minor	Yes	C1	All

<sup>7</sup> <https://www.uu.nl/en/research/transdisciplinary-field-guide/get-started/what-is-transdisciplinary-research>

<sup>8</sup> <https://sdgs.un.org/goals>

<sup>9</sup> <https://www.youtube.com/watch?v=xVWHuJOmaEk>

Time / Module	Mapping to course content	Example learning activity	Assessment Task	Relative Weighting	Work Requirement	Criterion	Criterion Elements
Module 1 - Research, trial and plan	<p>Managing Safety and Ethical issues.</p> <p>Working in an effective, safe and ethical team and environment.</p> <p>Predicts, analyses and monitors progress to mitigate safety and ethical issues within investigations.</p>	<ul style="list-style-type: none"> <li>Interpret the requirements to work safely in laboratory by considering WHS guidelines – working safely and risk management: <ul style="list-style-type: none"> <li>» Identify hazards—find out what could cause harm.</li> <li>» Assess risks, if necessary—understand the nature of the harm that could be caused by the hazard, how serious the harm could be and the likelihood of it happening. This step may not be necessary if you are dealing with a known risk with known controls.</li> <li>» Control risks – implement the most effective control measure that is reasonably practicable in the circumstances and ensure it remains effective over time.</li> <li>» Review hazards and control measures to ensure they are working as planned. <ul style="list-style-type: none"> <li>– Students can use the <a href="#">Safe Work Australia Code of Practice</a><sup>10</sup> to assist.</li> </ul> </li> </ul> </li> <li>Explore how to use and plan using <a href="#">Risk Assess</a><sup>11</sup> software.</li> <li>Interpret the ethics of scientific inquiry – medical, animal and cultural ethical guidelines. Resources include: <ul style="list-style-type: none"> <li>» <a href="#">DPIPWE Animal Research</a><sup>12</sup></li> <li>» <a href="#">UTAS – About Human Research Ethics</a><sup>13</sup></li> <li>» <a href="#">National Statement on Ethical Conduct in Human Research</a><sup>14</sup></li> <li>» <a href="#">Advice on including First Nations Tasmanian content</a><sup>15</sup>.</li> </ul> </li> <li>Practical activity to plan, assess risk and conduct into the properties of water from a variety of sites (marine and freshwater). Resources include:</li> </ul>	<p><b>Title of work requirement:</b> Logbook</p> <p><b>Mode or format:</b> investigation</p> <p>See the course document for more information.</p>			<p>C2</p> <p>C3</p> <p>C4</p> <p>C5</p>	<p>All</p> <p>All</p> <p>All</p> <p>All</p>

<sup>10</sup> [https://www.safeworkaustralia.gov.au/system/files/documents/1901/code\\_of\\_practice\\_-\\_how\\_to\\_manage\\_work\\_health\\_and\\_safety\\_risks\\_1.pdf](https://www.safeworkaustralia.gov.au/system/files/documents/1901/code_of_practice_-_how_to_manage_work_health_and_safety_risks_1.pdf)

<sup>11</sup> <https://www.riskassess.com.au/>

<sup>12</sup> <https://dipwe.tas.gov.au/biosecurity-tasmania/animal-biosecurity/animal-welfare/animal-research>

<sup>13</sup> <https://www.utas.edu.au/research-admin/research-integrity-and-ethics-unit-rieu/human-ethics/about-human-research-ethics>

<sup>14</sup> <https://www.nhmrc.gov.au/about-us/publications/national-statement-ethical-conduct-human-research-2007-updated-2018>

<sup>15</sup> <https://www.education.tas.gov.au/parents-carers/school-colleges/aboriginal-education-services/>

Time / Module	Mapping to course content	Example learning activity	Assessment Task	Relative Weighting	Work Requirement	Criterion	Criterion Elements
		<ul style="list-style-type: none"> <li>» <a href="#">Safety in Laboratories - Working Microbiologically</a><sup>16</sup></li> <li>» <a href="#">Safe Work Australia - Biological Hazards and Controls</a><sup>17</sup></li> </ul> <p>Reflect upon requirements to conducting investigations safely and ethically. Review the hazards and the control measures to assess if they were working as planned.</p>					
Term 1 - Week 3 Module 1 - Research, trial and plan	Research, Trial and Plan. Sustainability Issues. Field Trip and Analysis.	<ul style="list-style-type: none"> <li>• Learners will go on a whole class excursion to experience the sustainability issues in the local community.</li> <li>• Consider the following issues based around water: <ul style="list-style-type: none"> <li>» Clean water and sanitation (e.g. water treatment plant; sewerage treatment plant, etc.).</li> <li>» Affordable and clean energy (e.g. Hydro power generation, hydrogen power generation, etc.).</li> <li>» Sustainable cities (e.g. water storage and distribution, transport in water environments, etc.).</li> <li>» Climate action (e.g. global warming and water cycle changes, etc.).</li> <li>» Life below water and life on land (biodiversity, endangered and vulnerable species, agriculture, forests and other biomes, water in cells, osmosis, drought and desertification, erosion, ground water, ocean acidification, pollution, flow and ocean currents, etc.). <ul style="list-style-type: none"> <li>– Select based on student interest and school capacity to provide experiences.</li> </ul> </li> </ul> </li> <li>• The transdisciplinary nature of the problems being investigated will be drawn out. For example, chemistry, cell biology, earth science, microbiology, physics, astronomy, soil science, botany, zoology, ecology, engineering, statistics, environmental science, materials science, food science, agricultural science, crop science, marine science, biotechnology, climate science, inorganic chemistry,</li> </ul>	<b>Module 1 - Work Requirement 1 of 2</b> <b>Title of work requirement:</b> Logbook <b>Mode or format:</b> investigation See the course document for more information.	Minor	Yes	C1 C2 C3 C4 C5	All All All All All

<sup>16</sup> <https://www.biotek.com.au/assets/Uploads/Safety-Document-Microbiology.pdf>

<sup>17</sup> [https://www.safeworkaustralia.gov.au/system/files/documents/1702/nhews\\_biologicalmaterials.pdf](https://www.safeworkaustralia.gov.au/system/files/documents/1702/nhews_biologicalmaterials.pdf)

Time / Module	Mapping to course content	Example learning activity	Assessment Task	Relative Weighting	Work Requirement	Criterion	Criterion Elements
		<p>atmospheric sciences hydrology or oceanography.</p> <ul style="list-style-type: none"> <li>Primary data will be gathered from various sites and community members (dependent on the sites chosen to visit and the focus of the learners).</li> <li>Some resources to support this include: <ul style="list-style-type: none"> <li>» <a href="#">Teach Climate Science — Paleontological Research Institution</a><sup>18</sup></li> <li>» <a href="#">Forests and their impact on water quality and quantity</a><sup>19</sup></li> <li>» <a href="#">Insects at school - Entomology Australia</a><sup>20</sup></li> <li>» <a href="#">Renewable energy – Hydro Tasmania</a><sup>21</sup></li> <li>» <a href="#">Hydrogen Tasmania - CSIRO</a><sup>22</sup></li> <li>» <a href="#">Hydrogen Energy – U.S. Department of Energy</a><sup>23</sup></li> <li>» <a href="#">Soil Science Australia</a><sup>24</sup></li> <li>» <a href="#">Water and sewerage - TasWater</a><sup>25</sup></li> <li>» <a href="#">Water Sensitive Urban Design - EPA Tasmania</a><sup>26</sup></li> <li>» <a href="#">Drinking water quality - Tasmanian Department of Health</a><sup>27</sup></li> <li>» <a href="#">Water Quality Objectives for Tasmania - EPA Tasmania</a><sup>28</sup></li> </ul> </li> <li>Data will be collated and analysed and relationships between ideas elicited.</li> <li>Learners will reflect on the possible problems for them to investigate and select a question and identify disciplines and stakeholders for approaching this question.</li> <li>Peer-checking and feedback and whole class discussion to consider what is possible and further develop and refine ideas.</li> </ul>					

<sup>18</sup> <https://www.priweb.org/science-education-programs-and-resources/teach-climate-science#IRabsCO2>

<sup>19</sup> <https://www.forestlearning.edu.au/find-a-resource/article/71/forests-and-their-impact-on-water-quality-and-quantity.html>

<sup>20</sup> <https://entomology.edu.au/resources/insects-school>

<sup>21</sup> <https://www.hydro.com.au/education/secondary>

<sup>22</sup> <https://research.csiro.au/hyresource/hydrogen-tasmania/>

<sup>23</sup> <https://www.energy.gov/eere/fuelcells/downloads/h2-educate-teacher-and-student-guides>

<sup>24</sup> <https://www.soilscienceaustralia.org.au/training/soils-in-schools/teacher-guides/>

<sup>25</sup> <https://www.taswater.com.au/community/education/for-schools-and-customer-education>

<sup>26</sup> <https://epa.tas.gov.au/environment/water/stormwater/water-sensitive-urban-design>

<sup>27</sup> <https://www.health.tas.gov.au/health-topics/environmental-health/drinking-water-quality>

<sup>28</sup> <https://epa.tas.gov.au/environment/water/water-quality-objectives-for-tasmania>

Time / Module	Mapping to course content	Example learning activity	Assessment Task	Relative Weighting	Work Requirement	Criterion	Criterion Elements
		<ul style="list-style-type: none"> <li>Checkpoint with teacher (authentication and feedback) and laboratory technician (availability of resources and possibility of research).</li> </ul>					
Term 1 - Week 4 Module 1 - Research, trial and plan	<p>Research, Trial and Plan.</p> <p>Sustainability Issues.</p> <p>Research of Secondary sources and planning trial.</p> <p>Water link to bigger transdisciplinary problem being investigated.</p>	<ul style="list-style-type: none"> <li>Analyse and discuss concepts and processes from scientific theories and models to inquire into a system by research of secondary sources of possible methods/protocols to design trial inquiry.</li> <li>Analyse information they have researched to implement and adapt processes and trial methodologies while inquiring into a system evidenced by note taking in logbook and clearly differentiates the information, images, ideas and words of others from the learner's own.</li> <li>Evaluates the validity and reliability of data and information in an annotated bibliography of sources.</li> <li>Design of experiment (see course document appendix 7) considering the following; designs, conducts and improves investigations that collect valid, reliable data in response to a question or problem.</li> <li>Selects and uses data, organises and represents data to correctly identify trends, patterns or relationships, and discusses the validity and reliability of data. Student identifies the type of data to collect, tools, materials and chemicals required to be able to collect the valid and reliable data.</li> <li>Outline the protocol to follow (see possible properties of water protocols, such as this <a href="https://nre.tas.gov.au/Documents/Community_WQ_Sampling_-_Protocols.pdf">Tasmanian Community Water Quality Sampling Protocols</a><sup>29</sup> example).</li> <li>Identification and planning for mitigation of risks, and ethical issues.</li> <li>Order form of equipment/risk assessment completed.</li> <li>Peer review and feedback about trial protocol plans, refining of plans. Peer-checking and feedback and whole class</li> </ul>	<p><b>Module 1 - Work Requirement 1 of 2</b></p> <p><b>Title of work requirement:</b> Logbook</p> <p><b>Mode or format:</b> investigation</p> <p>See the course document for more information.</p>	Minor	Yes	C1 C2 C3 C4 C5	All All All All All

<sup>29</sup> [https://nre.tas.gov.au/Documents/Community\\_WQ\\_Sampling\\_-\\_Protocols.pdf](https://nre.tas.gov.au/Documents/Community_WQ_Sampling_-_Protocols.pdf)

Time / Module	Mapping to course content	Example learning activity	Assessment Task	Relative Weighting	Work Requirement	Criterion	Criterion Elements
		<p>discussion to consider what is possible and further develop and refine ideas.</p> <ul style="list-style-type: none"> <li>Checkpoint with teacher (authentication and feedback) and laboratory technician (conversation regarding plan, risk and requirements).</li> <li>Self-reflect on learning; uses planning strategies to ensure successful completion of tasks within agreed time frames.</li> </ul>					
Term 1 - Week 5 Module 1 - Research, trial and plan	<p>Research, Trial and Plan. Water Sustainability Issues. Research of secondary sources – contexts.</p>	<ul style="list-style-type: none"> <li>Research secondary sources about the local, national and international contexts of the question; apply the context of their inquiry locally, nationally and globally and explore relationships between technology, science and the broader community for a particular scientific application.</li> <li>Learners will analyse and discuss concepts and processes from scientific theories and models to inquire into a system by completing note taking using different methods (mind mapping, Cornell notes and layout/bullet method) in logbook.</li> <li>Evaluate the validity and reliability of data and information in an annotated bibliography of sources related to their issue.</li> <li>Provide feedback to others and seek feedback.</li> <li>Reflection in logbook to evaluate note taking process and to determine next step.</li> </ul>	<p><b>Module 1 - Work Requirement 1 of 2</b> <b>Title of work requirement:</b> Logbook <b>Mode or format:</b> investigation See the course document for more information.</p>	Major	Yes	C1 C2 C3 C4 C5	All All All All All
Term 1 - Week 6 Module 1 - Research, trial and plan	<p>Research, Trial, Plan. Water Sustainability issues. Initial trial of water experiment.</p>	<ul style="list-style-type: none"> <li>Explicit teaching - teacher lesson on data, types of data, how to collate, effective presentation and analysis of data.</li> <li>Construct appropriate data tables.</li> <li>Set up of experiment.</li> <li>Documentation of set up.</li> <li>Trial conducting – beginning set up, problem solving and analyses the validity and reliability of data and information.</li> <li>Refining set up where learners research, select, analyse and adapt methodologies to plan an inquiry.</li> </ul>	<p><b>Module 1 - Work Requirement 1 of 2</b> <b>Title of work requirement:</b> Logbook <b>Mode or format:</b> investigation See the course document for more information.</p>	Major	Yes	C1 C2 C3 C4 C5	All All All All All

Time / Module	Mapping to course content	Example learning activity	Assessment Task	Relative Weighting	Work Requirement	Criterion	Criterion Elements
		<ul style="list-style-type: none"> <li>Logging of thinking processes and any changes where learners analyse trials and information to refine the inquiry question and processes.</li> <li>Provide feedback to others seek feedback.</li> <li>Checkpoint with teacher (authentication and feedback) and laboratory technician (availability of resources; refining of method). Secondary research to solve problems where the learner analyses the validity and reliability of data and information.</li> </ul>					
Term 1 - Week 7 Module 1 - Research, trial and plan	Research, Trial, Plan. Sustainability issues. Trial of water experiment.	<ul style="list-style-type: none"> <li>Conducting trial, collecting data, evaluating data for reliability in logbook where the learner designs, conducts and improves investigations.</li> <li>Refining set up where the learner will design, conduct and improves investigations that collect valid, reliable data in response to a question or problem.</li> <li>Logging of thinking processes and any changes.</li> <li>Provide feedback to others seek feedback.</li> <li>Secondary Research to solve problems.</li> </ul>	<b>Module 1 - Work Requirement 1 of 2</b> <b>Title of work requirement:</b> Logbook <b>Mode or format:</b> investigation See the course document for more information.	Minor	Yes	C1 C2 C3 C4 C5	All All All All All
Term 1 - Week 8 Module 1 - Research, trial and plan	Research, Trial, Plan. Sustainability issues. Final trials of water experiment.	<ul style="list-style-type: none"> <li>Trials conducted where the learner designs, conducts and improves investigations that collect valid, reliable data in response to a question or problem.</li> <li>Refining set up where the learner trials, analyses and refines methodologies and processes while planning an inquiry.</li> <li>Data collation, presentation, analysis and evaluation.</li> <li>Logging of thinking processes and any changes where the learner analyses the ways in which observable processes and phenomena change.</li> <li>Secondary Research to solve problems where the learner analyses theories and model or models used to explain a system, supporting evidence and limitations.</li> <li>Reflection on inquiry process where the learner will analyse trials and information</li> </ul>	<b>Module 1 - Work Requirement 1 of 2</b> <b>Title of work requirement:</b> Logbook <b>Mode or format:</b> investigation See the course document for more information.	Major	Yes	C1 C2 C3 C4 C5	All All All All All



Time / Module	Mapping to course content	Example learning activity	Assessment Task	Relative Weighting	Work Requirement	Criterion	Criterion Elements
		<p>to refine the inquiry question and processes.</p> <ul style="list-style-type: none"> <li>Provide feedback to others seek feedback.</li> </ul> <p>Checkpoint with teacher (authentication and feedback) and laboratory technician (availability of resources; refining of method).</p>					
Term 1 - Week 9 Module 1 - Research, trial and plan	<p>Research and Plan.</p> <p>Experimental Research Outline.</p> <p>Creation/collation of experimental research outline.</p>	<ul style="list-style-type: none"> <li>an inquiry question justified through analysis of a sustainability problem with a transdisciplinary approach</li> <li>an analysis of background research summary with reference to scientific contexts applied</li> <li>an annotated bibliography of most relevant sources</li> <li>an experimental proposal – design outlined</li> <li>an analysis of trials of experimental design for their extended inquiry</li> <li>analysis and evaluation of interrelationships relationships within data collected and the system of study</li> <li>a future focus of experiments including a plan for module 2</li> <li>draft due to teacher at the end of the last lesson for feedback.</li> </ul> <p>The Experimental Research Outline will need to meet the Inquiry Project Approval Procedures (see course document appendix 7).</p>	<p><b>Module 1 - Work Requirement 2 of 2</b></p> <p><b>Title of work requirement:</b> Research and plan</p> <p><b>Mode or format:</b> investigation</p> <p>See the course document for more information.</p>	Major	Yes	C1 C2 C3 C4 C5 C6	All All All All All All
Term 1 - Week 10 Module 1 - Research, trial and plan	<p>Research and Plan.</p> <p>Experimental research outline.</p> <p>Final drafting of experimental research outline of conducting phase in Week 2 of Term 2.</p>	<ul style="list-style-type: none"> <li>Reflect on feedback from teacher to refine Experimental Research Outline.</li> <li>Complete Experimental Research Outline.</li> <li>Submit Final Draft of Research Outline.</li> </ul> <p>Submit and have a conversation with Laboratory Technician to organise equipment for beginning.</p>	<p><b>Module 1 - Work Requirement 2 of 2</b></p> <p><b>Title of work requirement:</b> Research and plan</p> <p><b>Mode or format:</b> investigation</p> <p>See the course document for more information.</p>	Major	Yes	C2 C3 C4 C5 C6	All All All All All
Term 2 - Week 1 Module 1 - Research, trial and plan	<p>Research, trial and plan.</p> <p>Local or national stakeholder views.</p> <p>Guest speaker's presentation of multiple views on sustainability and water.</p>	<ul style="list-style-type: none"> <li>Creation of questions to elicit the views of a variety of stakeholders and to seek help from experts to solve their problems.</li> <li>Considering the following: <ul style="list-style-type: none"> <li>local, national and global contexts</li> <li>role of collaboration and new evidence</li> </ul> </li> </ul>	<p><b>Module 1 - Work Requirement 1 of 2</b></p> <p><b>Title of work requirement:</b> Logbook</p> <p><b>Mode or format:</b> investigation</p> <p>See the course document for more information.</p>	Major	Yes	C1 C2 C3 C4 C5	All All All All All

Time / Module	Mapping to course content	Example learning activity	Assessment Task	Relative Weighting	Work Requirement	Criterion	Criterion Elements
		<ul style="list-style-type: none"> <li>» role of technologies</li> <li>» ways in which science meets specific needs in society.</li> </ul> <ul style="list-style-type: none"> <li>• Zoom meetings with experts and variety of stakeholders about their point of view and knowledge around issues of relevance for learner's inquiry.</li> <li>• Learners to collate and analyse points of view and knowledge from these people.</li> </ul> <p>Reflection on learning and the significance of ideas; planning what next/things to consider as a result. The learner will:</p> <ul style="list-style-type: none"> <li>• access, select, analyse and adapts information relevant to an inquiry</li> <li>• researches, selects, analyses and adapts methodologies to plan an inquiry.</li> </ul>					
Term 2 - Week 2 Module 2 - Conduct, monitor and refine	<p>Conduct, monitor and refine.</p> <p>Conducting:</p> <ul style="list-style-type: none"> <li>• Learner working in small groups to conduct investigation (staggered start: other groups will continue to engage with guest speaker's presentation of multiple views on sustainability and climate change).</li> </ul>	<ul style="list-style-type: none"> <li>• Teacher - provide detailed Module learner guide with assessment requirements for learners.</li> <li>• Organises and represents data to correctly identify trends, patterns or relationships, and discusses the validity and reliability of data.</li> <li>• Analyses the validity and reliability of data and information.</li> <li>• Reviews and analyses to refine and add methodologies to improve significant elements of experimental design and implementation.</li> <li>• Research multiple sources and refine the procedure represents data and information to clearly and accurately communicate concepts and ideas.</li> <li>• Logging progress, research notes, relationships, evaluation, planning, observations and data, time on task, peer and self-assessment.</li> <li>• Uses planning strategies to ensure successful completion of tasks within agreed time frames.</li> <li>• Analyses timelines, making modifications to improve outcomes.</li> </ul>	<p><b>Module 2 - Work Requirement 1 of 3</b></p> <p><b>Title of work requirement:</b> Logbook</p> <p><b>Mode or format:</b> investigation</p> <p>See the course document for more information.</p>	Major	Yes	C1 C2 C3 C4	All All All All

Time / Module	Mapping to course content	Example learning activity	Assessment Task	Relative Weighting	Work Requirement	Criterion	Criterion Elements
		<ul style="list-style-type: none"> <li>Initiates, performs, monitors and analyses tasks to ensure the completion of individual and collaborative activities.</li> <li>Monitors and analyses own and other learners' contributions to the successful completion of collaborative activities.</li> <li>Work with mentor to seek guidance and reflect on progress.</li> <li>Analyses trials and information to refine the inquiry question and processes.</li> </ul> <p>Or:</p> <ul style="list-style-type: none"> <li>Continue with research, trial, plan; local or national stakeholder view; guest speaker's presentation of multiple views on sustainability and water as per Term 2 Week 1.</li> </ul> <p>Briefly outlined here as:</p> <ul style="list-style-type: none"> <li>Creation of questions to elicit the views of a variety of stakeholders and to see help from experts to solve their problems.</li> <li>Zoom meetings with experts and variety of stakeholders about their point of view and knowledge around issues of relevance for learner's inquiry.</li> <li>Learners to collate and summarise points of view and knowledge from these people.</li> </ul> <p>Reflection on learning and the significance of ideas; planning what next/things to consider as a result.</p>					
Term 2 - Week 3 Module 2 - Conduct, monitor and refine	<p>Conduct, Monitor and Refine.</p> <p>Conducting:</p> <ul style="list-style-type: none"> <li>Learner working in small groups to conduct investigation.</li> <li>Documenting these above processes in the logbook.</li> </ul>	<p>This is a cyclical process for learners to conduct, reflect, refine, plan and repeat (with more replications or other disciplines or hypotheses to be considered); it will require continual negotiation with laboratory technician to develop equipment/protocols as focus changes:</p> <ul style="list-style-type: none"> <li>Conduct Science Inquiry - design and conduct ethical and safe collection and analysis of data within a specific application of science to inquire into a system.</li> <li>Analyse information they have researched to implement and adapt processes and trial methodologies while inquiring into a</li> </ul>	<p><b>Module 2 - Work Requirement 1 of 3</b></p> <p><b>Title of work requirement:</b> Logbook</p> <p><b>Mode or format:</b> investigation</p> <p>See the course document for more information.</p>	Major	Yes	C1 C2 C3 C4	All All All All

Time / Module	Mapping to course content	Example learning activity	Assessment Task	Relative Weighting	Work Requirement	Criterion	Criterion Elements
		<p>system Reflect on learning and inquiry process/protocol/generated data/problem solving with questions:</p> <ul style="list-style-type: none"> <li>» What happened?</li> <li>» Create a graph to show results more clearly if appropriate.</li> <li>» Are there any trends, patterns or relationships evident from your results?</li> <li>» What to the results tell you about your original question and hypothesis?</li> <li>» In what ways was the result different from your prediction?</li> <li>» Were there any unexpected results? Why do you think these occurred?</li> <li>» What do other stakeholders; points of view; secondary sources suggest about the reasons for findings?</li> <li>» In other contexts, collaborations, how does this compare?</li> <li>» How could technology further develop findings?</li> <li>» What does this make you think about the problem being investigated?</li> <li>» Are the results reliable? Are there any errors (systematic or random)?</li> <li>» Using scientific ideas try to explain the observable results.</li> <li>» What improvements might you make to your experimental design?</li> <li>» What are further things that could be investigated?</li> </ul> <ul style="list-style-type: none"> <li>• Teacher as resource to assist in probing questions and guiding problem solving - collaborate with others and monitor, critically analyse and manage their own learning within a scientific inquiry</li> <li>• Research secondary sources for possible solutions to problems - research, selects, analyses and adapts methodologies to plan an inquiry.</li> <li>• Seek peer feedback - collaborate with others and monitor, critically analyse and manage their own learning within a scientific inquiry.</li> </ul>					

Time / Module	Mapping to course content	Example learning activity	Assessment Task	Relative Weighting	Work Requirement	Criterion	Criterion Elements
		<ul style="list-style-type: none"> <li>Refine understanding and inquiry process - analyses trials and information to refine the inquiry question and processes.</li> <li>Adjust protocol - trials, analyses and refines methodologies and processes while planning an inquiry.</li> <li>Self and peer - evaluation of progress against a checklist from the Work requirements from Module 2 and Module 3 - analyses the validity and reliability of data and information.</li> <li>Plan for next week negotiation with group members, mentor, teacher and laboratory technician.</li> </ul>					
Term 2 - Week 4 Module 2 - Conduct, monitor and refine	As per Term 2 – Week 3.		<b>Module 2 - Work Requirement 1 of 3</b> <b>Title of work requirement:</b> Logbook <b>Mode or format:</b> investigation See the course document for more information.	Major	Yes	C1 C2 C3 C4	All All All All
Term 2 - Week 5 Module 2 - Conduct, monitor and refine	As per Term 2 – Week 3.		<b>Module 2 - Work Requirement 1 of 3</b> <b>Title of work requirement:</b> Logbook <b>Mode or format:</b> investigation See the course document for more information.	Major	Yes	C1 C2 C3 C4	All All All All
Term 2 - Week 6 Module 2 - Conduct, monitor and refine	As per Term 2 – Week 3.		<b>Module 2 - Work Requirement 1 of 3</b> <b>Title of work requirement:</b> Logbook <b>Mode or format:</b> investigation See the course document for more information.	Major	Yes	C1 C2 C3 C4	All All All All
Term 2 - Week 7 Module 2 - Conduct, monitor and refine	As per Term 2 – Week 3.		<b>Module 2 - Work Requirement 1 of 3</b> <b>Title of work requirement:</b> Logbook <b>Mode or format:</b> investigation See the course document for more information.	Major	Yes	C1 C2 C3 C4	All All All All
Term 2 - Week 8 Module 2 - Conduct, monitor and refine	As per Term 2 – Week 3.		<b>Module 2 - Work Requirement 1 of 3</b> <b>Title of work requirement:</b> Logbook <b>Mode or format:</b> investigation See the course document for more information.	Major	Yes	C1 C2 C3 C4	All All All All

Time / Module	Mapping to course content	Example learning activity	Assessment Task	Relative Weighting	Work Requirement	Criterion	Criterion Elements
Term 2 - Week 9 Module 2 - Conduct, monitor and refine	Conduct, Monitor and Refine. Quad chart. Oral Presentation and Finalised inquiry question and context. Planning & drafting Quad chart and finalised inquiry question and context.	<ul style="list-style-type: none"> <li>Draft Quad chart - communicate data and information using standard scientific conventions for qualitative and quantitative representation, and evaluate its reliability:               <ul style="list-style-type: none"> <li>» outline the finalised inquiry question</li> <li>» finalise the method/protocol</li> <li>» represent the results</li> <li>» reasoned conclusions up until the end of module 2 with reference to the scientific disciplines applied.</li> </ul> </li> <li>Seeking and providing feedback to/from peers and teacher.</li> <li>Self-reflection of learning and evaluation of progress.</li> </ul> <p>Learners will draft 1500-word finalised inquiry question and context and will work on it through week 9 and 10, for submission at the end of Week 1 in Term 3. It will include:</p> <ul style="list-style-type: none"> <li>Justifying their choice of inquiry question with reference to data collected; processes undertaken; other relevant information.</li> <li>Summarising and analysing the local, national and global context to provide an appropriate and relevant background for their inquiry, which may include analysis.</li> <li>Communicating data and information using standard scientific conventions for qualitative and quantitative representation, and evaluate its reliability.</li> </ul>	<p><b>Module 2 - Work Requirement 2 of 3</b></p> <p><b>Title of work requirement:</b> Finalised inquiry question and context</p> <p><b>Mode or format:</b> product</p> <p>See the course document for more information.</p>	Major	Yes	C4 C5 C7	All All EI, 3
Term 2 - Week 10 Module 2 - Conduct, monitor and refine	Conduct, Monitor and Refine. Quad chart. Oral Presentation and Finalised inquiry question and context. Creating Quad chart and Drafting Oral: <ul style="list-style-type: none"> <li>Communicate data and information using standard scientific conventions for qualitative and quantitative representation, and evaluate its reliability:</li> </ul>	<ul style="list-style-type: none"> <li>Outline the finalised inquiry question.</li> <li>Finalise the method/protocol.</li> <li>Represent the results.</li> <li>Reasoned conclusions up until the end of module 2 with reference to the scientific disciplines applied.</li> </ul> <p>Create Quad Chart using software:</p> <ul style="list-style-type: none"> <li>Note: An A2 document can be produced using two A3 or four A4 pages that can be assembled into a A2 document. This matches the structure of a standard quad chart. Learners will complete a presentation explaining their quad chart and their plans for module 3.</li> </ul>	<p><b>Module 2 - Work Requirement 3 of 3</b></p> <p><b>Title of work requirement:</b> Quad chart and future plans presentation</p> <p><b>Mode or format:</b> performance</p> <p>See the course document for more information.</p>	Major	Yes	C3 C4 C7	All All All

Time / Module	Mapping to course content	Example learning activity	Assessment Task	Relative Weighting	Work Requirement	Criterion	Criterion Elements
		<p>Oral presentation: 5-minute presentation and 5 minutes for questions.</p> <ul style="list-style-type: none"> <li>Practice a 60 second outline of investigation so far as a class activity.</li> <li>Provide feedback and seek feedback on effective oral presentation - collaborate with others and monitor, critically analyse and manage their own learning within a scientific inquiry.</li> <li>Drafting of 5-minute Oral presentation - communicate data and information using standard scientific conventions for qualitative and quantitative representation, and evaluate its reliability.</li> <li>Prepare some possible questions and practice answering these.</li> <li>Practice of 5-minute Oral presentation and questioning.</li> </ul> <p>Learners will continue to draft 1500-word finalised inquiry question and context and will work on it through week 9 and 10, with the draft to be submitted at the end of week 1 in term 3. A final draft will be submitted at the end of week 2 in term 3.</p>					
Term 3 - Week 1 Module 2 - Conduct, monitor and refine	<p>Conduct, Monitor and Refine. Quad chart. Oral Presentation and Finalised inquiry question and context. Practicing of Oral presentation of Quad Chart and Creation of Finalised inquiry question and context.</p>	<ul style="list-style-type: none"> <li>Reflect on the progress of the investigation: <ul style="list-style-type: none"> <li>» What have you learned?</li> <li>» What are your struggles?</li> <li>» What is working well?</li> <li>» How can you improve?</li> <li>» What should be your next steps?</li> </ul> </li> <li>Seek feedback from teacher and mentor about reflection.</li> </ul> <p>Decide on the final inquiry phase for module 3 and create a detailed plan for Module 3 and outline time allocated for analysis, evaluation and communication, and a summary of relationships with the local, national and global context so far.</p> <p>Learners will submit draft 1500-word Finalised inquiry question and context at the end of week 1 and the final draft will be submitted at the end of week 2 in term 3.</p> <p>Learners will seek feedback from both peers, teacher and mentor (if available) - collaborate</p>	<p><b>Module 2 - Work Requirement 3 of 3</b> <b>Title of work requirement:</b> Quad chart and future plans presentation <b>Mode or format:</b> performance See the course document for more information.</p>	Minor	Yes	C3 C4 C7	All All All

Time / Module	Mapping to course content	Example learning activity	Assessment Task	Relative Weighting	Work Requirement	Criterion	Criterion Elements
		with others and monitor, critically analyse and manage their own learning within a scientific inquiry.					
Term 3 - Week 2 Module 2 - Conduct, monitor and refine	Conduct, Monitor and Refine.  Quad chart.  Oral Presentation and Finalised inquiry question and context.  Presentation of Quad chart and submission of Finalised inquiry question and context.	<ul style="list-style-type: none"> <li>• Rehearsal practice of oral presentation.</li> <li>• Seek and provide feedback to others about presentation.</li> <li>• Reflection and action upon feedback.</li> <li>• Final drafting of finalised inquiry question and context and quad chart.</li> <li>• Presentation of 5-minute recordings or live presentations of quad chart.</li> </ul> Submit finalised inquiry question and context.	<b>Module 2 - Work Requirement 3 of 3</b>  <b>Title of work requirement:</b> Quad chart and future plans presentation  <b>Mode or format:</b> performance  See the course document for more information.	Major	Yes	C3 C4 C7	All All All
Term 3 - Week 3 Module 3 - Review, represent and recommend	Inquiry Logbook.  Evaluation of science inquiry progress.  Reflection and Next steps.	<ul style="list-style-type: none"> <li>• Reflect on feedback from Module 2.</li> <li>• Provide detailed Module 3 learner guide with assessment requirements for learners.</li> <li>• Evaluate scientific inquiry:               <ul style="list-style-type: none"> <li>» What am I trying to find out?</li> <li>» What have I found out so far?</li> <li>» What do I need to still investigate?</li> <li>» What questions will I need to leave to investigate later or put in the parking lot?</li> <li>» What is working well?</li> <li>» What can I improve on?</li> <li>» What does the research say about possible opportunities?</li> </ul> </li> <li>• Planning final phase of investigation (final questions and methods to be refined).</li> <li>• Negotiation with teacher, laboratory technician, group members etc to clarify roles, tasks and responsibilities.</li> </ul> Begin to conduct final phase of the inquiry over 2 and ½ weeks.	<b>Module 3 - Work Requirement 1 of 3</b>  <b>Title of work requirement:</b> Logbook  <b>Mode or format:</b> investigation  See the course document for more information.	Minor	Yes	C1 C2 C3 C4	All All All All
Term 3 - Week 4 Module 3 - Review, represent and recommend	Final Conducting and refining phase.  Generating and refining data.  Experimenting.	<ul style="list-style-type: none"> <li>• Conduct investigation to fill in gaps of data gathered or to repeat or revise design.</li> <li>• Collecting and organising data.</li> <li>• Reflecting on learning each lesson; prioritising tasks and planning next steps.</li> <li>• Seeking feedback from peers and teachers about progress.</li> </ul>	<b>Module 3 - Work Requirement 1 of 3</b>  <b>Title of work requirement:</b> Logbook  <b>Mode or format:</b> investigation  See the course document for more information.	Major	Yes	C1 C2 C3 C4	



Time / Module	Mapping to course content	Example learning activity	Assessment Task	Relative Weighting	Work Requirement	Criterion	Criterion Elements
Term 3 - Week 5 Module 3 - Review, represent and recommend	Final Conducting and refining phase; Generating and refining data; Experimenting.	<ul style="list-style-type: none"> <li>Conduct investigation to fill in gaps of data gathered or to repeat or revise design.</li> <li>Collecting and organising data.</li> <li>Reflecting on learning each lesson; prioritising tasks and planning next steps.</li> <li>Seeking feedback from peers and teachers about progress.</li> <li>Drawing together findings; collating ideas and reflection on inquiry process about what has been learned.</li> </ul>	<b>Module 3 - Work Requirement 1 of 3</b> <b>Title of work requirement:</b> Logbook <b>Mode or format:</b> investigation See the course document for more information.	Major	Yes	C1 C2 C3 C4	
Term 3 - Week 6 Module 3 - Review, represent and recommend	Inquiry Folio. Scientific paper. Introduction, Materials, Method, Risk assessment and Ethical considerations.	<ul style="list-style-type: none"> <li>Research the broader context of the investigation and how it can be applied scientifically and take notes in logbook.</li> <li>Seek and provide feedback to others; collaborate with others and monitor, critically analyse and manage their own learning within a scientific inquiry.</li> <li>Reflect on the significance of the research for stakeholders in the in broad context of the situation being investigated in logbook.</li> <li>Evaluate the reliability of the research for bias and reliability.</li> <li>Summarise the research from different scales (local, national and global) and how it is applied.</li> <li>Outline the context of the investigation, locally, nationally and globally and draw out the relationships between technology, science and the broader community for a particular scientific application.</li> <li>Outline the materials, method, risk assessment and ethical considerations from the investigation.</li> </ul>					
Term 3 - Week 7 Module 3 - Review, represent and recommend	Performance. Produce AI poster; - poster design. Inquiry Folio/Scientific paper/Representation and analysis of data.	Performance; Produce AI poster; Poster design. <ul style="list-style-type: none"> <li>Direct teaching - outline scientific conventions for poster communication.</li> <li>Teacher to showcase effective design of poster; learners to evaluate model posters for effective communication.</li> <li>Develop skills in software to be able to make the poster.</li> </ul>	<b>Module 3 - Work Requirement 3 of 3</b> <b>Title of work requirement:</b> Poster <b>Mode or format:</b> product See the course document for more information.	Major	Yes	C3 C4 C8	All All All

Time / Module	Mapping to course content	Example learning activity	Assessment Task	Relative Weighting	Work Requirement	Criterion	Criterion Elements
		<ul style="list-style-type: none"> <li>Create a draft plan for layout of poster (headings, subheadings, images, diagrams, graphs, and white space) in logbook.</li> </ul> <p>Inquiry Folio/Scientific paper/Representation and analysis of data:</p> <ul style="list-style-type: none"> <li>Teacher (Explicit teaching): Outline of effective communication of data as graphs, tables, diagrams etc.</li> <li>Teacher to provide models for learners to evaluate for effectiveness.</li> <li>Select and create the most appropriate mode for communication of raw data generated by investigation.</li> <li>Analysis of trends, patterns and evaluation of the data for reliability; sources of error (systematic and random).</li> <li>Consideration of how these errors could be minimised to improve design of the investigation.</li> </ul> <p>Consideration of science ideas and theories that could explain these patterns in the data.</p>					
Term 3 - Week 8 Module 3 - Review, represent and recommend	<p>Inquiry Folio.</p> <p>Scientific Paper - Writing Discussion, Recommendations, Conclusion, Acknowledgements and Finalise Reference list.</p> <p>Inquiry Folio/Poster - create final draft of poster.</p>	<ul style="list-style-type: none"> <li>Explicit teaching to outline for learners the tools of effective scientific writing of discussion – how to reference diagrams and sources; how to structure paragraphs (CER framework); how to assess and evaluate the data..</li> <li>Refine skills and knowledge about Referencing both in text and creating an effective reference list.</li> <li>Make recommendations for further questions to research and the broader application of the research.</li> <li>Conclusion needs to be a summary and link to hypothesis.</li> <li>Brainstorm assistance from people to make sure that all who assisted are acknowledged.</li> <li>Refine poster design based on feedback from peers and staff.</li> <li>Create poster using software program.</li> </ul>	<p><b>Module 3 - Work Requirement 2 of 3</b></p> <p><b>Title of work requirement:</b> Scientific paper</p> <p><b>Mode or format:</b> inquiry</p> <p>See the course document for more information.</p>	Minor	Yes	C3 C4 C8	All All All

Time / Module	Mapping to course content	Example learning activity	Assessment Task	Relative Weighting	Work Requirement	Criterion	Criterion Elements
Term 3 - Week 9 Module 3 - Review, represent and recommend	Inquiry Folio. Writing Abstract and Drafting process of scientific paper.	<ul style="list-style-type: none"> <li>Direct teaching about the purpose of an abstract.</li> <li>Learner evaluation of model abstracts for effectiveness.</li> <li>Write abstract.</li> <li>Feedback sought from and provided to peers along with feedback sought from teacher and mentor.</li> </ul>	<b>Module 3 - Work Requirement 2 of 3</b> <b>Title of work requirement:</b> Scientific paper <b>Mode or format:</b> inquiry See the course document for more information.	Major	Yes	C3 C4 C8	All All All
Term 3 - Week 10 Module 3 - Review, represent and recommend	Inquiry Folio. Final drafting process and submission. Learners are to finalise scientific paper.	<ul style="list-style-type: none"> <li>Learners refine and act on feedback from peers, staff and mentor/critical friends.</li> </ul> Learners can submit scientific paper into competitions.	<b>Module 3 - Work Requirement 2 of 3</b> <b>Title of work requirement:</b> Scientific paper <b>Mode or format:</b> inquiry See the course document for more information.	Major	Yes	C3 C4 C8	All All All
Term 4 - Week 1 Module 3 - Review, represent and recommend	External assessment is due this week.	A folio consisting of: <ul style="list-style-type: none"> <li>The final inquiry question and context created in Module 2.</li> <li>A scientific paper as a culminating performance for the course.</li> </ul> An image of a poster created as a culminating performance for the course for validation purposes.					
Term 4 - Week 2 Module 3 - Review, represent and recommend	Performance practice; Present AI poster and live presentation: <ul style="list-style-type: none"> <li>Practice – 60 seconds pitch summary of the investigation on the spot.</li> <li>Seek and provide feedback on skills to practice in logbook.</li> <li>Outline of requirements for presentation.</li> <li>Practice responding to typical questions that might be asked.</li> <li>Seek and provide feedback to each other on responses to questions in logbook.</li> </ul>	<ul style="list-style-type: none"> <li>Practical assessment consisting of:               <ul style="list-style-type: none"> <li>» A performance – presentation of poster to panel of examiners.</li> <li>» 3-minute presentation to markers.</li> <li>» 8-12-minute question and answer by markers.</li> </ul> </li> <li>Learners will communicate data and information using standard scientific conventions for qualitative and quantitative representation, and evaluate its reliability.</li> <li>Outline effective oral science communication skills.</li> <li>Evaluate a model of scientific communication for effectiveness of communication (pace, eye contact, engagement, tone of voice, reference to scientific data etc).</li> </ul>					
Term 4 - Week 3 Module 3 - Review,	Performance practice; Present AI poster and live presentation.	<ul style="list-style-type: none"> <li>Create script of presentation.</li> <li>Seek feedback from mentor, staff and peers.</li> </ul>					

Time / Module	Mapping to course content	Example learning activity	Assessment Task	Relative Weighting	Work Requirement	Criterion	Criterion Elements
represent and recommend		<ul style="list-style-type: none"> <li>Practice presentation.</li> <li>Seek feedback from mentor, staff and peers.</li> </ul>					
Term 4 - Week 4 Module 3 - Review, represent and recommend	Performance practice; Present AI poster and live presentation.	<ul style="list-style-type: none"> <li>Practice presentation.</li> <li>Seek feedback from mentor, staff and peers.</li> </ul>					
Exams		<ul style="list-style-type: none"> <li>A folio consisting of: <ul style="list-style-type: none"> <li>» The final inquiry question and context created in Module 2</li> <li>» A scientific paper as a culminating performance for the course</li> <li>» An image of a poster created as a culminating performance for the course for validation purposes.</li> </ul> </li> <li>Practical assessment consisting of: <ul style="list-style-type: none"> <li>» A performance – presentation of poster to panel of examiners.</li> </ul> </li> </ul>	<p><b>External assessment:</b> Folio (Final inquiry question and context + Scientific paper) and Poster presentation.</p> <p>Refer to External assessment specifications.</p>				

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