# **Science Level 1 Course Outline 1**

# Guide to aid teacher planning only - designed to be printed or viewed in A3, Landscape.

## Purpose

This example Course Outline has been produced to help teachers and schools understand the new NCEA Learning and Assessment matrices and could be used to create a year-long programme of learning. It will give teachers ideas of how the new standards might work to assess the curriculum at a particular level.

## Context: Our Place; Land, Air, Water, and Life

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| **Significant Learning** | **Learning activities and assessment opportunities**  Throughout the year assessment for learning happens often. Evidence may also be collected for summative assessment. | **Duration**  Total of 32 weeks |
| Develop evidence-based responses to socio-scientific issues based in kaitiakitanga (including problems, needs, and opportunities) at a personal, community, or global level  Identify more than one perspective related to socio-scientific issues  Use science ideas and knowledge to broaden their own world view of socio-scientific issues | **Our Land and Life**  Explore aspects of the taiao to build new capabilities such as disciplinary meaning-making, perspective-taking, and critical inquiry. Use these capabilities to develop evidence-based opinions and respond to socio-scientific issues.  Incorporate world views, experiences, and knowledge of ākonga, with respect to the taiao.  With a systems thinking view, consider the [interacting processes](https://www.sciencelearn.org.nz/resources/720-earth-system) within the geosphere that shape and affect the surface and all interconnected life on Earth.  Learn how [mātauranga Māori](https://www.sciencelearn.org.nz/videos/652-matauranga-maori) recognises the interconnectedness of all life.  Consider the importance of life processes and recognise that this knowledge is pivotal to understanding the world as a complex system.  Recognise that ecosystems with more biological diversity are more likely to survive environmental changes, including those induced by humans.  Learn how the survival of individuals is dependent on interconnected processes, including other organisms within the ecosystem.  Invite local kaumātua to share pūrākau about locally significant landmarks, or source these via local museums, media, or council resources.  Select a local issue that is significant for ākonga, eg bush reserve project, living next to a quarry, [waterway health](https://www.sciencelearn.org.nz/image_maps/94-stream-health-monitoring-and-assessment).  **Opportunity for assessment of SC1.1 - Develop a science-informed response to a local socio-scientific issue** | 6 weeks |
| Use simple scientific processes to develop questions and investigate the taiao through a variety of different approaches  Compare and contrast different scientific methods used to explore the taiao  Compare, contrast, and evaluate (individually or through talanoa or wānanga) the suitability of the scientific methods used to explore the taiao | Explore the development of science ideas that are used to understand our land, its formation, and its continuously changing surface features, eg the [rock cycle](https://www.sciencelearn.org.nz/resources/1490-the-rock-cycle).  Learn and apply the attributes of science and recognise that there is no single method in science.  Use different [investigation approaches](https://www.sciencelearn.org.nz/resources/3038-investigating-in-science) appropriate for answering different questions, for example:   * explore and observe materials present in the rohe * classify rock samples * identify patterns of strata visible in local road cuttings * learn how different [soils](https://www.sciencelearn.org.nz/resources/981-visual-soil-assessment) are structured and how they behave in relation to liquids * explore organic decomposition and learn how microorganisms can affect soil quality * consider soil structures and how they differ across the region through water filtration.   Invite industry specialists, who utilise knowledge of soils and rocks in their job, to discuss relevant concepts with ākonga. Consider Zoom interviews conducted by ākonga or visit a construction site, road works site, or tree nursery to speak to civil engineers, planners, or horticulturists.  Explore evidence of interacting processes within the geosphere that shape and affect the Earth’s surface and organisms, eg Wegener’s evidence for [continental drift](https://www.sciencelearn.org.nz/resources/952-continental-drift) or [Joan Wiffens](https://www.sciencelearn.org.nz/resources/2426-heritage-scientist-timeline-joan-wiffen) records of dinosaur fossils.  **Opportunity for assessment of SC1.2 - Use a range of scientific investigative approaches in a taiao context** | 6 weeks |
| Process science ideas and knowledge using kotahitanga principles to track developments in scientific understanding  Understand that the needs and values of a society can influence the focus of scientific endeavour  Identify aspects of curiosity, collaboration, and creativity in science and the development of scientific ideas | Recognise mātauranga Māori uses the concept of whakapapa to understand the interconnectedness of all life and the importance of life processes.  Explore the origins of New Zealanders, eg early Māori; [where they came from](https://www.sciencelearn.org.nz/resources/2019-dna-diversity-in-early-new-zealanders) and [how they got here](https://www.thevoyage.co.nz/en/video/33_Migration-The-Untold-Story), with consideration to the skills used by [Pacific navigators](https://maatauranga.co.nz/). Also consider other [ethnicities within Aotearoa New Zealand](https://www.msd.govt.nz/about-msd-and-our-work/publications-resources/journals-and-magazines/social-policy-journal/spj36/36-who-are-we.html).  Learn about the genomic links across the Pacific, eg kumara, chickens, and kiore**.** Engage with [video resources](https://www.otago.ac.nz/allan-wilson-research/study/africa-to-aotearoa.html) that demonstrate the knowledge base built by Lisa Matisoo Smith. Profile careers such as hers in Anthropology or Genetics via [career websites](https://www.careers.govt.nz/).  Explore the development of the science ideas that we use to understand DNA and genetic variation. Recognise that DNA is the unit of inheritance and carries information in a chemical code.  Learn and apply the attributes of science. Recognise that the language, conventions, and processes of DNA and genetic variation provide ākonga with tools to interrogate scientific claims, evaluate the robustness of science, and recognise pseudoscience.  Explore the ideas that lead to the discovery of DNA.  Consider the development and implications of the Human Genome project and explore claims in the media regarding genetic modification.  **Opportunity for collection of report material for assessment of SC1.3 - Describe features of science involved in the development of a scientific idea in an Aotearoa New Zealand or Pacific context**  **Opportunity for assessment of SC1.4 - Demonstrate understanding of science claims in communicated information using māramatanga** | 5 weeks |
| Use scientific language, conventions, and representations to communicate scientific understanding and present this in different ways depending on the audience | **Our Air and Life**  Learn how science operates and explore the appropriate tools that can be used by ākonga in their own science practice.  Explore the properties of substances observable at the macroscopic level. Recognise that they can be explained by, but are different from, the structures of atoms and molecules and the interactions between them.  Explore the rearrangements of matter via [chemical reactions,](https://www.sciencelearn.org.nz/resources/1650-chemical-reactions-and-catalysts) and recognise that they involve changes at the atomic and sub-atomic level.  Learn about the science of the [atmosphere](https://www.sciencelearn.org.nz/resources/240-gaseous-atmosphere) to provide opportunities for studying:   * atomic structure * bonding * molecules * nature of matter, ie gases, diffusion, density.   Consider how scientific knowledge has developed, extended, and changed over time.  Explore the history of [atomic theory](https://www.thoughtco.com/history-of-atomic-theory-4129185) and the investigation of chemical reactions, as they provide opportunities for formative assessment of SC1.3 and 1.2, respectively.  **Opportunity for collection of report material for assessment of SC1.3 - Describe features of science involved in the development of a scientific idea in an Aotearoa New Zealand or Pacific context** | 5 weeks |
| Apply their understanding of science to critique scientific claims, explanations, or predictions made in communicated information | Explore the nature of heat and heat transfer, including concepts such as:   * conduction * convection * radiation.   Learn how heat energy transfers from regions of relative warmth to colder regions.  Consider claims made in the media about [climate change](https://climatekids.nasa.gov/climate-change-meaning/#:~:text=Credit%3A%20USGS-,Climate%20change%20describes%20a%20change%20in%20the%20average%20conditions%20%E2%80%94%20such,a%20long%20period%20of%20time.&text=These%20include%20warming%20temperatures%20and,Shrinking%20mountain%20glaciers), global warming, or cell tower radiation.  **Opportunity for assessment of SC1.4 - Demonstrate understanding of science claims in communicated information using māramatanga**  Explore wave motion as a means to transfer energy without transferring matter.  Compare sound waves to those on the electromagnetic spectrum. Explore the nature of electromagnetic fields and learn about the propagation of energy as waves and light.  Learn how heat transfer has made food safe for consumption.  Consider how the development of home insulation has changed over time.  Explore animal echolocation, sonar, or the development of [telecommunications](https://www.knowitall.org/document/history-telecommunications-kids-work).  **Opportunity for collection of report material for assessment of SC1.3 - Describe features of science involved in the development of a scientific idea in an Aotearoa New Zealand or Pacific context** | 5 weeks |
| Compare and contrast different scientific methods used to explore the taiao  Compare, contrast, and evaluate (individually or through talanoa or wānanga) the suitability of the scientific methods used to explore the taiao  Apply their understanding of science to critique scientific claims, explanations, or predictions made in communicated information | **Our Water and Life**  Different investigation approaches are appropriate for answering different questions. Learn about the [water cycle](https://www.sciencelearn.org.nz/resources/713-h-o-on-the-go-the-water-cycle-introduction) and the interacting processes within and between the hydrosphere, biosphere, atmosphere, and geosphere. Consider how these interacting processes shape and affect the Earth’s surface, climate, and organisms.  Explore the nature of [acids and bases](https://www.sciencelearn.org.nz/resources/3019-acids-and-bases-introduction), and learn about [pH](https://www.sciencelearn.org.nz/videos/1969-ph) and neutralisation.  Investigate chemical reactions and the formation of ionic compounds.  Invite industry specialists who are involved in hydrology, wastewater treatment, irrigation, environmental water monitoring, etc – these could be individuals or groups from the regional or city council.  To illustrate potential pathways for ākonga, profile individuals working in the industry, or use [career websites](https://www.careers.govt.nz/). Visit [LEARNZ](http://www2.learnz.org.nz/core-fieldtrips.php) to complete a virtual field trip on wastewater, irrigation, or sustainable water use.  **Opportunity for assessment of SC1.2 - Use a range of scientific investigative approaches in a taiao context**  Consider claims made in the media and critique their science validity. For example, does neutral mean safe? Is bottled water better?  **Opportunity for assessment of SC1.4 - Demonstrate understanding of science claims in communicated information using māramatanga** | 5 weeks |