# **Science Level 1 Course Outline 2**

# 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: Me and My World

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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 issuesUse science ideas and knowledge to broaden their own world view of socio-scientific if issues  | **My Impact on Biodiversity**Using a mātauranga Māori perspective, recognise the interconnectedness of all life and the importance of life processes. Explore the existence of, and the relationships between, organisms and systems in the natural world through concepts such as whakapapa, mauri, tapū, noa, and kaitiakitanga. Refer to the Mātauranga Māori framework for L1 Science. Recognise that populations, not individuals, adapt to their environment as a result of evolution. Appreciate that genetic variation is essential for evolutionary change. Understand that when populations cannot adapt to the rate of environmental change, extinction occurs. Recognise that ecosystems with more biological diversity are more likely to survive environmental changes, including those induced by humans. Learn how changes in one sphere can cause changes to other spheres, often in unexpected and complex ways. Explore the school grounds, or further afield, to investigate the biodiversity present in the environment. Identify and classify species, and learn about the [threats to biodiversity](https://www.sciencelearn.org.nz/resources/1465-threats-to-biodiversity). Invite speakers to discuss the importance of biodiversity, via Zoom interviews or visits from industry experts.Consider topics related to biodiversity, including:* pest-free 2050
* [biodiversity](https://www.doc.govt.nz/biodiversity) in Aotearoa New Zealand
* implications of introduced species
* the [unique ecosystem](https://www.sciencelearn.org.nz/resources/1599-our-changing-ecosystems-timeline) in Aotearoa New Zealand
* species recovery or conservation efforts
* traditional [mātauranga Māori approaches](https://www.scoop.co.nz/stories/HL1909/S00064/veronika-meduna-kaitiakitanga-seeing-nature-as-your-elder.htm) to conservation.

Explore a mātauranga Māori [framework](http://www.journal.mai.ac.nz/sites/default/files/MAIJrnl_7_1_Hutchings_02.pdf) for understanding soil health.**Opportunity for assessment of SC1.1 - Develop a science-informed response to a local socio-scientific issue.** | 8 weeks |
| Use simple scientific processes to develop questions and investigate the taiao through a variety of different approachesCompare and contrast different scientific methods used to explore the taiaoCompare, contrast, and evaluate (individually or through talanoa or wānanga) the suitability of the scientific methods used to explore the taiao  | **Resources for My Survival**Explore how scientists and kaitiaki have developed their understanding of food and water resources, heat, and fuels. Learn how technologies have aided these advancements. Organise student-led interviews with industry specialists, eg supermarket manager, town planner, or electrical engineer. Illustrate the potential pathways for ākonga or refer to [career websites](https://www.careers.govt.nz/) for detailed information.Understand that the properties of substances observable at the macroscopic level can be explained by, but are different from, the structures of atoms and molecules and the interactions between them. Rearrangements of matter via chemical reactions can be observed at the macroscopic level, with changes at the atomic and sub-atomic level. Recognise that the total amount of matter remains the same in chemical reactions.Compare still water and sparkling water.Visit a local nursery or market garden and investigate the varying growing conditions.Consider what a balanced diet is and explore the different perspectives on meat consumption. Compare the [water footprint](https://www.royalsociety.org.nz/assets/Uploads/Virtual-Water-v2.0.pdf) of producing meat versus vegetables.Investigate different ways of [purifying water](https://sciencing.com/school-projects-water-purification-treatments-7879769.html). Invite industry specialists to speak about their involvement in waste management, irrigation, etc Illustrate the potential pathways for ākonga, profile individuals working in the industry, or use [career websites](https://www.careers.govt.nz/). Learn about concepts related to energy, for example:* energy is the capacity to do work
* heat energy transfers from regions of relative warmth to colder regions
* wave motion transfers energy without transferring matter
* [solar ovens](https://www.sciencelearn.org.nz/resources/1754-making-a-solar-oven)
* [traditional cooking methods](https://teara.govt.nz/en/maori-foods-kai-maori/page-2)
* insulation materials and the development of insulation in housing
* sustainability of non-renewable energy sources
* development of [renewable energy](https://www.sciencelearn.org.nz/resources/1571-renewable-energy-sources)
* energy produced by different fuels and the impact of fossil fuel use.

**Opportunity for assessment of SC1.2 – Use a range of scientific investigative approaches in a taiao context.****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.** | 8 weeks |
| Process science ideas and knowledge using kotahitanga principles to track developments in scientific understandingUnderstand that the needs and values of a society can influence the focus of scientific endeavourIdentify aspects of curiosity, collaboration, and creativity in science and the development of scientific ideas | **My Physical Health** Explore mātauranga Māori principles that recognise the interconnectedness of all life and the importance of life processes. Explore techniques and equipment used in a scientific laboratory, for example:* observe cells using microscopes
* consider the [history of microscopy](https://www.sciencelearn.org.nz/resources/1692-history-of-microscopy-timeline)
* learn about the development of scientific equipment.

Recognise that DNA is the unit of inheritance and it carries information in a chemical code. Understand that the survival of individuals is dependent on interconnected processes, including other organisms within the ecosystem. Engage in investigations such as:* pulse rate
* modelling of the knee joint
* motion
* food as fuel
* energy drink comparisons
* sweat absorption of different materials
* reaction rates to a starting gun.

Consider the scientific claims made in the media, through marketing goods, and in health-related services. Invite a personal trainer, physiotherapist, sports coach, or restauranteur to speak to ākonga about the knowledge that informs their work. Learn about organ donation, the differing [perspectives](https://www.rnz.co.nz/news/te-manu-korihi/400996/hui-aims-to-raise-rate-of-maori-organ-transplants), and the development of this process.Explore mechanics concepts from a health perspective, for example:* force is required to change motion
* Newton’s three laws of motion
* changing masses on force required with or without kneecap
* science behind the [chair challenge](https://www.fatherly.com/health-science/chair-challenge-explained-viral-fitness-trend/)
* standing jump versus height
* strength and grip measurements
* acceleration investigations.

Explore how scientists and mātauranga Māori experts have developed their understanding of physical health and learn how this has been aided by technology.**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.** | 8 weeks |
| Use scientific language, conventions, and representations to communicate scientific understanding and present this in different ways depending on the audienceApply their understanding of science to critique scientific claims, explanations, or predictions made in communicated information. | **My Future**Recognise that wave motion transfers energy without transferring matter, as detailed in [Pacific navigation](https://maatauranga.co.nz/).Explore forces acting at a distance and explain these in terms of fields. Investigate claims related to [biodegradable plastics](https://www.sciencenewsforstudents.org/article/biodegradable-plastic-bags-often-dont-break-down).Explore [nanoscience](https://www.sciencelearn.org.nz/resources/2166-nanoscience-introduction) and the [development of nanotechnology](https://nanohub.org/dataviewer/view/publication%3Adsl/prj_db_191_5cbef138495e4a1a7281455fa65bb35bc11959d0/?v=1). Learn about 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. Recognise that the total amount of matter remains the same in chemical reactions.Recall that the distribution of heat energy within the Earth system is dynamic and can be affected by human activity. Recognise that changes in one sphere can cause changes to other spheres, often in unexpected and complex ways. Explore the potential career pathways related to chemistry, eg fertiliser manufacturing, food and nutrition, pharmaceutical sciences. Invite industry specialists to speak about their career or use [career websites](https://www.careers.govt.nz/) to illustrate opportunities for ākonga. Explore the development of superconductors, bionic technology, [laboratory-grown organs](https://www.smithsonianmag.com/science-nature/organs-made-to-order-863675/), or [3-D printing of tissues](https://www.sciencenewsforstudents.org/article/fashioning-inks-print-tissues).Consider the [impact of biotechnology on society](https://www.sciencelearn.org.nz/resources/1209-impacts-of-biotechnology-on-society).Discuss [future energy sources](https://www.visualcapitalist.com/alternative-energy-sources-future/) and explore how these would be produced, the potential benefits, and the current limitations. For example, learn about hydrogen power, wave or tidal power, solar power, or battery technology. Explore the potential methods for mitigating climate change, eg population control, limiting fossil-fuelled transport, and carbon sinks.[Explore the development of 5G](https://www.livescience.com/65959-5g-network.html) technology.Learn about the [chemical discoveries](https://nzic.org.nz/scientific-sleuthing/) made in Aotearoa New Zealand. Create a [unique product](https://www.curiousminds.nz/stories/weaving-new-materials-with-old/) by blending new techniques with traditional Māori techniques.**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.** | 8 weeks |