# **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 |
| Consider mātauranga Māori and Pacific knowledges alongside science in contexts that relate to Aotearoa New Zealand and the PacificConsider how different perspectives can be used when making decisions on socio-scientific issuesConsider how the values and needs of a society can influence the focus of scientific endeavours | **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. 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 (online) 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 - Demonstrate understanding of a science-informed response to a local issue.** | 8 weeks |
| Engage with the iterative process of science investigation through innovation, problem solving, inquiry, collaboration, and evaluationRecognise how different approaches can be used in science investigationsRecognise that scientific ideas are developed through critical and creative thinking, regulated by evidenceRecognise that science ideas are communicated using a range of methods with discipline-specific practices | **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 – Demonstrate understanding of the use of a range of scientific investigative approaches in a context** **Opportunity for collection of report material for assessment of SC1.3 - Describe the features of science that have contributed to the development of a science idea in a local context** | 8 weeks |
| Consider mātauranga Māori and Pacific knowledges alongside science in contexts that relate to Aotearoa New Zealand and the PacificRecognise that scientific ideas are developed through critical and creative thinking, regulated by evidenceRecognise that science ideas are communicated using a range of methods with discipline-specific practicesConsider how the values and needs of a society can influence the focus of scientific endeavours | **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 the features of science that have contributed to the development of a science idea in a local context** **Opportunity for assessment of SC1.4 - Demonstrate understanding of science-related claims in communicated information** | 8 weeks |
| Identify interrelationships between science practices, technological advances, mātauranga Māori, and the practical advancement of science knowledgeRecognise that scientific ideas are developed through critical and creative thinking, regulated by evidenceUse science understanding to critique claims or predictions made in communicated informationConsider how the values and needs of a society can influence the focus of scientific endeavours | **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.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 the features of science that have contributed to the development of a science idea in a local context****Opportunity for assessment of SC1.4 - Demonstrate understanding of science-related claims in communicated information** | 8 weeks |