# **PES 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.

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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 |
| Understand that the taiao is centred on mauri, and encompassed and maintained by kaitiakitanga, and described in science as consisting of interacting spheres - the hydrosphere, biosphere, atmosphere, and geosphere  Examine interactions between the hydrosphere, biosphere, atmosphere, and geosphere. Through aspects of whakapapa, consider how these interactions are woven into te ao Māori.  Explore the effects of natural, and human-induced changes to the taiao. Explore how mauri is an essential part of the natural and human-constructed world and how it is essential to maintain or restore mauri. | **The way our land has changed with time**   * Understand that te ao Māori acknowledges the interconnectedness of all living and non-living things, and explore how the relationship of Māori and the environment stems from their whakapapa to Ranginui and Papatūānuku. * Learn how the [Earth system’s four spheres](https://www.sciencelearn.org.nz/resources/720-earth-system) interact and consider how, over time, these interactions have changed aspects of Aotearoa New Zealand.      * Kōrero about traditional stories such as:   + [Māui and the Sun](https://www.sciencelearn.org.nz/resources/1752-maui-and-the-sun)   + [Kupe](https://www.sciencelearn.org.nz/resources/638-kupe-and-modern-voyaging). * Explore how [pepeha](https://pepeha.nz/) can be used to make connections with the natural world, by learning identifying phrases such as:   + ko … te maunga   + ko … te awa   + ko … te roto/moana. * Choose a natural feature (eg a local stream, nearby coastal habitat, or the surrounding air quality) in your area that has been negatively affected by human activity, and consider:   + how the feature originally formed   + how human activity has affected the feature   + the oral and written history that informs our understanding of how the feature has changed   + potential scientific and kaitiakitanga approaches for mitigating further damage or initiating restoration and protection of the feature. * Consider how Māori knew that [Te Ika-a-Māui](https://teara.govt.nz/en/whenua-how-the-land-was-shaped/page-2) was the shape of a fish without the use of satellites. * Learn about [Rūaumoko](https://teara.govt.nz/en/historic-earthquakes/page-1) and explore how earthquakes [shape](https://www.sciencelearn.org.nz/resources/930-earthquakes-and-volcanoes) Aotearoa New Zealand.   **Opportunity for assessment of AS 1.1 Demonstrate understanding of human-induced changes within the Earth system** | 5 weeks |
| Understand that the taiao is centred on mauri, and encompassed and maintained by kaitiakitanga, and described in science as consisting of interacting spheres - the hydrosphere, biosphere, atmosphere, and geosphere.  Examine interactions between the hydrosphere, biosphere, atmosphere, and geosphere. Through aspects of whakapapa, consider how these interactions are woven into te ao Māori.  Explore the effects of natural, and human-induced changes to the taiao. Explore how mauri is an essential part of the natural and human constructed world and how it is essential to maintain or restore mauri. | **Our land it still changing**   * Recognise that the taiao can be changed locally, nationally, and globally, through natural events such as:   + [earthquakes](https://www.sciencelearn.org.nz/resources/930-earthquakes-and-volcanoes)   + [volcanoes](https://teara.govt.nz/en/volcanoes)   + [tsunamis](https://www.sciencelearn.org.nz/resources/125-comparing-tsunamis-and-surf)   + [extreme weather](https://www.sciencelearn.org.nz/resources/2188-extreme-weather). * Understand the natural changes that occur within the Earth system by learning about: * the different types of volcanic eruptions * how earthquakes occur * how [cyclones](https://www.sciencelearn.org.nz/resources/2189-cyclones-typhoons-and-hurricanes) form * how tsunamis can occur in [lakes](https://niwa.co.nz/news/lake-tekapo-study-raises-awareness-of-tsunamis-in-nz-lakes) and oceans * the different types of [landslides](https://getready.govt.nz/emergency/landslides) and what causes them. * Find out how human activities have negatively impacted the Earth system, by learning about:   + [coastal erosion](https://teara.govt.nz/en/coastal-erosion) around Aotearoa New Zealand or a chosen Pacific Island   + erosion and weathering of the land caused by weather events   + [plastic](https://www.royalsociety.org.nz/assets/Uploads/Plastics-in-the-Environment-evidence-summary.pdf) pollution in the marine environment   + human-induced factors that contribute to climate change, eg burning [fossil fuels](https://www.sciencelearn.org.nz/videos/1242-fossil-fuel-emissions)   + future predictions of extreme weather events   + destabilisation of waterway banks through removal of [riparian vegetation](https://www.aucklandcouncil.govt.nz/environment/plants-animals/plant-for-your-ecosystem/Documents/streamside-planting-guide.pdf). * Explore the steps being taken in your local area to mitigate the impact of human-induced changes on the Earth system and restore the mauri of the taiao, for example:   + planting trees to stabilise a hillside and reduce [erosion](https://teara.govt.nz/en/soil-erosion-and-conservation/page-3)   + managing coastal water supplies so that salination doesn’t occur.   **Opportunity for assessment of AS 1.1 Demonstrate understanding of human-induced changes within the Earth system** | 6 weeks |
| Use systematic and scientific processes, models, and other representations, to explain physics, Earth, and space science principles and explore how these processes are applied in a taiao context. Explore how different ways of applying models can strengthen the work of kaitiakitanga to restore mana and mauri to a system.  Understand that forces have an effect on the motion of objects in the taiao. In a variety of contexts, including te ao Māori, understand how the application of forces and its effect on motion has been used effectively in the past and is also being used effectively in the present.  Explore how energy transfers are involved in everyday interactions. Understand how the knowledge and significance of energy transfer has been passed down through pūrākau and tikanga practices. Learn how these same science concepts are still being applied to a variety of te ao Māori activities today. | **Magnetism is a phenomenon which has been influential to human technological development**   * Consider the relationship between [magnetism](https://www.sciencelearn.org.nz/concepts/magnetism) and human endeavour. * Investigate the nature of [magnetic fields](https://teara.govt.nz/en/magnetic-field). * Explore technological [applications of magnetism](https://www.sciencelearn.org.nz/resources/2561-using-magnetism), eg [navigation](https://www.lenscience.auckland.ac.nz/en/about/teaching-and-learning-resources/senior-biology-learning-resources/animal-navigation-magnetic-sense/what-is-magnetic-sense.html). * Consider how [plants](https://science.nasa.gov/science-news/science-at-nasa/2002/15may_maggrav) and [animals](https://teara.govt.nz/en/bird-migration/page-6) use the Earth’s magnetic field. * Learn about Aotearoa New Zealand’s natural sources of magnetism, eg [ironsand](https://teara.govt.nz/en/photograph/5878/magnetic-ironsand). * Consider the [environmental impact](https://www.greenpeace.org/aotearoa/story/what-is-seabed-mining-and-why-does-it-threaten-the-oceans/) of ironsand mining. * Investigate magnetic field strength with a variety of magnets. * Learn how to make an [electromagnet](https://www.sciencelearn.org.nz/resources/2564-making-an-electromagnet). * Engage in practical investigations of magnetism, for example:   + use ironsand to demonstrate magnetic field patterns for different shaped magnets   + use compasses to investigate the Earth’s magnetic field   + [draw magnetic fields](https://www.bbc.co.uk/bitesize/guides/z3s4qhv/revision/3)   + calculate magnetic field strength.   **Opportunity for assessment of AS 1.2 Demonstrate understanding of a physics phenomenon in the taiao through modelling, and for formative assessment of AS 1.4 Demonstrate understanding of physics concepts in the taiao** | 6 weeks |
| Explain how maramataka is used to gain mōhiotanga of tātai arorangi as we describe interactions between the sun and Earth-Moon systems and their effect on planet Earth.  Describe interactions between the Sun and Earth-Moon system. Explore how people can use tātai arorangiandkaitiakitanga to inform their actions. | **Our observations are linked to our beliefs**   * Recognise that Māori observed the movement of the [Sun, Moon, and stars](https://teara.govt.nz/en/ranginui-the-sky/page-4) to make [predictions about natural events](https://teara.govt.nz/en/matariki/print). * Observe the [phases](https://rasnz.org.nz/in-the-sky/lunar-phases) of the [Moon](https://www.sciencelearn.org.nz/resources/2466-the-moon-and-its-misconceptions) over an extended investigation. * Learn about [tidal cycles](https://environment.govt.nz/assets/Publications/Files/MFE_Coastal_Fact-Sheet-4.pdf) and investigate how the [phases of the moon](https://teara.govt.nz/en/ocean-currents-and-tides/page-2) and the spin of the Earth affect freshwater and marine environments. * Consider the [maramataka](https://www.sciencelearn.org.nz/resources/2961-maori-ways-of-knowing-weather-and-climate) and its influence on how humans interact with the taiao, eg fishing, agriculture. * Consider local knowledge of the interactions of [deep time](https://serc.carleton.edu/quantskills/methods/quantlit/DeepTime.html) and deep distance in terms of Earth and space systems. * Collect data from one location over time (day, month, year) to investigate how the surface temperature and angle of the Sun varies. * Investigate temperature in relation to sunshine hours. * Learn about (and celebrate) [Matariki](https://www.tepapa.govt.nz/discover-collections/read-watch-play/matariki-maori-new-year), te tau hou Māori.   **Opportunity for formative assessment of 1.3 Demonstrate understanding of the effects on planet Earth of interactions between the Sun and the Earth-Moon system** | 5 weeks |
| Use systematic and scientific processes, models, and other representations, to explain physics, Earth, and space science principles and explore how these processes are applied in a taiao context. Explore how different ways of applying models can strengthen the work of kaitiakitanga to restore mana and mauri to a system.  Explore how energy transfers are involved in everyday interactions. Understand how the knowledge and significance of energy transfer has been passed down through pūrākau and tikanga practices. Learn how these same science concepts are still being applied to a variety of te ao Māori activities today.  Understand that the total amount of energy is maintained when it is transferred during an event. Te ao Māori acknowledges the interconnectedness and interrelationship of all living and non-living things. Understand the cultural significance to Māori of seeking to understand the total system, and the role energy conservation plays in it. | **Energy around us**   * Using physics concepts, explore the relationship between the Sun and Earth. For example, learn about:   + solar energy   + heat transfer and transformation   + light   + water waves generated by the wind. * Conduct simple [conduction, convection, and radiation](https://www.sciencelearn.org.nz/resources/750-heat-energy) investigations to better understand how heat energy is transferred. * Learn about the different types of materials that are used for insulation and reduce heat loss, for example:   + [home insulation](https://www.smarterhomes.org.nz/smart-guides/heating-cooling-and-insulation/types-of-insulation/)   + penguins’ feathers. * Identify energy transformations in everyday situations, for example:   + [heat pumps](https://www.sciencelearn.org.nz/resources/241-heat-pumps-and-energy-transfer)   + water [waves](https://www.sciencelearn.org.nz/resources/120-waves-as-energy-transfer)   + growing and eating [food](https://www.sciencelearn.org.nz/resources/1833-unlocking-the-energy-in-foods). * Explore the different types of stones that are suitable for [holding heat within a hāngi pit](https://www.mpi.govt.nz/dmsdocument/1057-Food-Safety-practices-in-preparing-and-cooking-a-hangi-He-whakatairanga-i-nga-ahuatanga-mahi-mo-te-tunu-hangi). * Investigate simple electrical circuits. * Learn about renewable energy and the different sources from which energy can be generated, eg wind, solar, hydro, geothermal. * Make a solar still that turns salt water into fresh water using solar energy. * Complete [practical investigations](https://www.sciencelearn.org.nz/topics/light-and-colour?type=activities) to better understand [reflection, refraction, and dispersion of white light](https://www.sciencelearn.org.nz/resources/39-light-and-sight-introduction). * Investigate [water waves](https://www.sciencelearn.org.nz/resources/121-behaviour-of-waves) and learn how wave length and frequency are measured. * Explore concepts of motion by:   + thinking about the motion of different objects, eg waka, poi, playground swing, acrobat, rocket, sky diver   + investigating the velocity, distance, and time of a moving object   + investigating the rate of an object speeding up (accelerating) and slowing down (decelerating)   + graphically and mathematically representing collected data from an investigation.   **Opportunity for assessment of AS 1.2 Demonstrate understanding of a physics phenomenon in the taiao through modelling, and for formative assessment of AS 1.4 Demonstrate understanding of physics concepts in the taiao** | 6 weeks |
| Examine interactions between the hydrosphere, biosphere, atmosphere, and geosphere. Through aspects of whakapapa, consider how these interactions are woven into te ao Māori. | **Listening to the land**   * Consider the complex frameworks related to water management and recognise te ao Māori perspectives that help us care for and protect the taiao in Aotearoa New Zealand, eg kaitiakitanga. * Explore the origin of Earth’s water by:   + considering te ao Māori and the connection Māori have with the water (through whakapapa)   + learning about the [water cycle](https://www.sciencelearn.org.nz/resources/721-the-water-cycle) within the hydrosphere. * Using the [mauri model](http://mauriometer.org/), consider the wellbeing of a local freshwater source. * Investigate the flow rate of a freshwater source and link this to the waterway health.   **Opportunity for assessment of AS** **1.1 Demonstrate understanding of human-induced changes within the Earth system** | 4 weeks |