# **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 matrices and could be used to create a year-long programme of learning. It should be used as an illustrative guide for how the Big Ideas, Significant Learning and the suite of support documents might be used to support teaching and learning, along with its assessment, at Curriculum Level 6.

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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 hydrosphere, biosphere, atmosphere, and geosphere interact in the Earth system Explore how Earth processes interact and influence the surface, climate, and life on Earth Explore natural and human-induced changes on Earth systems and consider the implications of their effects Interpret representations, critique evidence, and communicate knowledge within Physics, Earth and Space Science contextsApply inquiry approaches to develop understanding of Physics, Earth and Space Science concepts, including how mātauranga Māori can inform inquiry practice | 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 tiaki approaches for mitigating further damage, such as rāhui, 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 against AS 1.1 Demonstrate understanding of human-induced change within the Earth system**  | 5 weeks |
| Understand that the hydrosphere, biosphere, atmosphere, and geosphere interact in the Earth system Explore how Earth processes interact and influence the surface, climate, and life on Earth Explore natural and human-induced changes on Earth systems and consider the implications of their effects Interpret representations, critique evidence, and communicate knowledge within Physics, Earth and Space Science contextsApply inquiry approaches to develop understanding of Physics, Earth and Space Science concepts, including how mātauranga Māori can inform inquiry practice | Our land it still changing* Recognise that the environment 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 change 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 against AS 1.1 Demonstrate understanding of human-induced change within the Earth system** | 6 weeks |
| Interpret representations, critique evidence, and communicate knowledge within Physics, Earth and Space Science contexts Apply inquiry approaches to develop understanding of Physics, Earth and Space Science concepts, including how mātauranga Māori can inform inquiry practiceUnderstand that a range of physics concepts can be used to explain an interaction Explore the nature of energy and force in the physical world Apply relevant modelling techniques to demonstrate understanding of physical phenomena within Physics, Earth and Space Science contexts | The pressure of being forced to move* [Explore the causes of movement](https://www.sciencelearn.org.nz/resources/2261-physical-world-forces) in our world by:
	+ thinking about and observing the [motion](https://www.sciencelearn.org.nz/videos/1877-newton-s-first-law-of-motion) of different objects, eg, waka, poi, playground swings (pendulums), [rockets](https://www.sciencelearn.org.nz/images/399-rocket-forces), sky divers, falling leaves
	+ carrying out and designing investigations that record the speed of moving objects, through measurement of time and/or distance
	+ [investigating the rate of an object speeding up (accelerating) and slowing down (decelerating)](https://www.sciencelearn.org.nz/resources/2717-an-investigation-of-motion)
	+ graphically and mathematically representing collected data from an investigation.
* Investigating the effect of force on an object’s movement, stability, or integrity (does it crush?)
* Find out about [buoyancy](https://www.sciencelearn.org.nz/resources/3183-floating-and-sinking-exploring-forces) through the testing of variations in raft or boat design
* Test parachute and/or paper-copter wing designs to explore how [surface area affects air-resistance](https://www.sciencelearn.org.nz/images/286-forces-affecting-flight)
* Explore the relationship between pressure and frictional forces
	+ the use of cleated shoes in sport.

**Opportunity for assessment against AS 1.2 Demonstrate understanding of a physical phenomenon through investigation** | 6 weeks |
| Investigate observable interactions between the Sun and the Earth-Moon systemExplore how Earth processes interact and influence the surface, climate, and life on Earth Interpret representations, critique evidence, and communicate knowledge within Physics, Earth and Space Science contextsApply inquiry approaches to develop understanding of Physics, Earth and Space Science concepts, including how mātauranga Māori can inform inquiry practiceUnderstand that a range of physics concepts can be used to explain an interactionApply relevant modelling techniques to demonstrate understanding of physical phenomena within Physics, Earth and Space Science contexts | 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 against 1.3 Demonstrate understanding of the effect on Earth of interactions between the Sun and the Earth-Moon system** | 5 weeks |
| Understand that Physics, Earth, and Space Science knowledge is continuously developed through collaboration and review Investigate observable interactions between the Sun and the Earth-Moon systemExplore how Earth processes interact and influence the surface, climate, and life on Earth Interpret representations, critique evidence, and communicate knowledge within Physics, Earth and Space Science contexts Apply inquiry approaches to develop understanding of Physics, Earth and Space Science concepts, including how mātauranga Māori can inform inquiry practice Understand that a range of physics concepts can be used to explain an interaction Explore the nature of energy and force in the physical world Apply relevant modelling techniques to demonstrate understanding of physical phenomena within Physics, Earth and Space Science contexts | Energy around us* Using physics concepts, explore the relationship between the Sun and the 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 transfer and transformation 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).
* 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).

**This unit supports formative assessment against AS 1.3 Demonstrate understanding of the effect on Earth of interactions between the Sun and the Earth-Moon system, *and* 1.4 Demonstrate understanding of energy in a physical system** | 6 weeks |
| Investigate observable interactions between the Sun and the Earth-Moon systemExplore how Earth processes interact and influence the surface, climate, and life on Earth Interpret representations, critique evidence, and communicate knowledge within Physics, Earth and Space Science contextsApply inquiry approaches to develop understanding of Physics, Earth and Space Science concepts, including how mātauranga Māori can inform inquiry practice | 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 environment in Aotearoa New Zealand, eg, tiaki.
* 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 against AS** **1.1 Demonstrate understanding of human-induced change within the Earth system** | 4 weeks |