# **PES 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.

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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 |
| Use systematic and scientific processes, models, and representations, to explain physics and Earth and Science principles. In te ao Māori, through mana aotūroa (exploration) and rangahau (research), explore how these processes are applied in a taiao context. Explore how practices such as kaitiakitanga can apply models in different ways when working to restore mana and mauri to a system.Explore how energy transfers are involved in everyday interactions (e.g. cooking food, household electricity). In te ao Māori, through rangahau, understand how the knowledge and significance of energy transfer has been passed down through pūrākau and tikanga practices. Through mana aotūroa, learn how these same science concepts relate to a variety of te ao Māori contexts and activities today. | It’s all about energy: considering electricity and magnetism through interactions with the physical world.* Explore DC Circuits - series and simple parallel circuits, Ohm’s Law and power.
* Explore electrical protection for house wiring.
* Investigate conductors and insulators for charge separation.
* Solve simple V=IR calculations
* Explore and represent magnetic fields.

These activities provide opportunities for collecting evidence towards **AS 1.2 - Use models to demonstrate understanding of a physics phenomenon (Electrical power in the home) (internal)** | 5 weeks |
| Explore how energy transfers are involved in everyday interactions (e.g. cooking food, household electricity). In te ao Māori, through rangahau, understand how the knowledge and significance of energy transfer has been passed down through pūrākau and tikanga practices. Through mana aotūroa, learn how these same science concepts relate to a variety of te ao Māori contexts and activities today.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. | Staying warm and keeping cool: implications of thermal energy from a personal to a global scale.* Investigate insulators to keep cold things cold, and warm things warm (simple conduction and convection practicals).
* Why are warmer houses healthier?  Investigate implications of household insulation.
* Investigate the ways fire has traditionally been used.  How did people find out which wood burned the best?

These activities provide opportunities for formative assessment of **AS** **1.4 Demonstrate understanding of forces and motion (external)*** Consider how geothermal energy continues to impact our lives.
* What is the difference between climate and weather? Explore how traditional knowledge developed about the climate and weather. How was this tested? Recognise that weather and climate are found in the lower part of the atmosphere – the troposphere
* Investigate how clouds are formed. and use clouds to predict weather.

These activities provide opportunities for collecting evidence towards **AS** **1.1 Demonstrate understanding of changes within the Earth system (fossil fuels)(internal)** | 5 weeks |
| Use systematic and scientific processes, models, and representations, to explain physics and Earth and Science principles. In te ao Māori, through mana aotūroa (exploration) and rangahau (research), explore how these processes are applied in a taiao context. Explore how practices such as kaitiakitanga can apply models in different ways when working to restore mana and mauri to a system.Understand that forces have an effect on the motion of everyday objects (e.g. a car, a football). Through mana aotūroa and rangahau, understand how the application of forces and its effect on motion has been used in the past and is also being used in the present, in te ao Māori contexts. | Getting moving. Transportation plays a large role in the way we live and work, and how we move around the country. Consider both traditional and current modes of transportation on the water.* Carry out simple investigations into distance and time with respect to constant speed.
* Calculate speed from distance-time graphs.
* Draw force diagrams for objects moving at constant acceleration.
* Use Newton’s Laws to explain the motion of objects.
* Consider basic forces in relation to a number of different modes of transportation, eg sailing, automobiles, trains, planes etc. How was wind used to cross the Pacific?

These activities provide opportunities for formative assessment of **AS** **1.4 Demonstrate understanding of forces and motion** **(external)** | 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. | Renewable energy. What is the history and future of electrical generation in Aotearoa New Zealand? What are the environmental impacts on Aotearoa New Zealand in terms of land-based resources?* Research renewable electrical sources in Aotearoa New Zealand.
* Investigate how much of our electrical generation comes from hydro, wind and geothermal sources, and how it is used in our homes
* What energy sources did Māori and Pacific peoples use in the past?
* Why is Tāwhirimatea so important for climate and the ocean currents?

These activities provide opportunities for collecting evidence towards **AS 1.2 - Use models to demonstrate understanding of a physics phenomenon (Electrical power in the home) (internal)** | 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.Through mātai (observation), examine interactions between the hydrosphere, biosphere, atmosphere, and geosphere. Through aspects of whakapapa, consider how these interactions are woven into te ao Māori.Explore through rangahau the effects of natural (e.g. landslides), and man-made (e.g. burning fossil fuels) changes to the taiao. In te ao Māori, explore how mauri is an essential part of the natural and man-made world and how it is essential to maintain or restore mauri. | Why is our climate warming?Investigate interactions between the geosphere, hydrosphere, and atmosphere by considering:* What transformation of energy happens when incoming sunlight (shortwave solar radiation) hits the Earth’s surface?  What effect does the outgoing heat (long-wave infra-red radiation) from the Earth’s surface have on the atmosphere?
* Explore the normal greenhouse effect, and how it affects planet earth’s average temperature, and the enhanced greenhouse effect, where excess CO2 in the atmosphere is warming the Earth system.
* Investigate the natural events and human activity that put large amounts of carbon dioxide into the atmosphere – e.g. volcanic eruptions in New Zealand and the Pacific (natural), over-use of fossil fuels, making concrete (human).
* Understand how volcanoes form by exploring how New Zealand straddles two colliding tectonic plates. Tell and realise the significance of pūrākau that speak about signs of impending eruptions.
* Find out what fossil fuels are, how they were formed over time and why humans use them so much. How is the burning of fossil fuels causing human-induced temperature rises?
* What are the implications of global warming due to climate change on the Earth system? Explore the implications such as climate change, more frequent and stronger storms and sea level rise.
* What are the implications of climate change in relation to the role of kaitiakitanga, and what are the legal implications for traditional uses of land, air and water?

These activities provide opportunities for collecting evidence towards **AS** **1.1 Demonstrate understanding of changes within the Earth system (Fossil fuels)(internal)**These activities provide opportunities for formative assessment of **1.3 Demonstrate understanding of the effects on planet Earth of relationships between the Sun and the Earth-Moon system (external)** | 5 weeks |
| Through matai, describe interactions between the Sun and Earth-Moon system (e.g. day/night, seasons, tides, habitability). In te ao Māori, explore how tatai arorangi and kaitiakitanga can inform aspects of everyday life.Through rangahau, explain the effects of interactions between the Sun and Earth-Moon system on conditions on planet Earth (e.g. surface temperature changes with latitude, neap, spring and king tides). In te ao Māori, explain how rangahau processes are used to gain mōhiotanga and maramatanga of tatai arorangi. | How do the Sun and the Moon impact our day to day lives?Choose from a variety of learning activities, depending on the time of year, such as: * exploring the daytime surface temperature relative to the day/night cycle, the season and the tilt of the Earth relate to the orbit of Earth around the Sun, latitude, and the amount of solar energy hitting the Earth’s surface.
* use models of the Sun and Earth to investigate how the angle of the Sun can affect temperature, measure the length of shadows and/or the temperature of sand at different times of the day and in different seasons and latitude (encompassing the equator to Antarctica and including South Pacific islands.
* investigate the relationship of the Sun, Earth and Moon in the formation of tides, especially neap, spring and king tides.

Consider the importance of the sun from a number of perspectives, including Māori. These activities provide opportunities for formative assessment of **1.3   Demonstrate understanding of the effects on planet Earth of relationships between the Sun and the Earth-Moon system (external)** | 5 weeks |
| Use systematic and scientific processes, models, and representations, to explain physics and Earth and Science principles. In te ao Māori, through mana aotūroa (exploration) and rangahau (research), explore how these processes are applied in a taiao context. Explore how practices such as kaitiakitanga can apply models in different ways when working to restore mana and mauri to a system. | The Sun and the Earth: What is the nature of light?* Consider the electromagnetic spectrum, with particular focus on visible light, infra-red and UV.
* Use c=f.lambda to consider the relationship between frequency and wavelength for visible light.
* Complete practical investigations to consider simple reflection and refraction of white light.

These activities provide opportunities for collecting evidence towards **AS 1.2 - Use models to demonstrate understanding of a physics phenomenon (Healthy buildings) (internal)** | 5 weeks |