# **AH 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.

## Horticultural Production Systems Focus

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| **Significant Learning** | **Learning activities and assessment opportunities**Assessment for learning happens often throughout the year. Evidence may also be collected for summative assessment. | **Duration** Total of 32 weeks |
| Utilise discipline specific language and graphics used in agricultural and horticultural contextsExplore roles and career pathways throughout the primary sector Explore how life processes affect primary productionExplore how and why primary production management practices are done as they areUse investigative approaches within agricultural and horticultural contextsExplore the interrelationship between primary production and soil properties | Primary producers manage life processes and the growing environment **Plant life processes**Explore the interrelationships of living things in a production system to recognise that no living thing exists alone, but rather is part of an interconnected system that includes soils, climate and people, that influences life processes, and contributes to the lives of [groups of people](https://www.youtube.com/watch?v=3c_fDAH_CjQ).Look at the key life processes plants undertake as part of typical growing/production (should be accompanied by practical or experiments where possible). **Examining life processes***Plant processes should include germination, flowering, photosynthesis, respiration, transpiration, and nutrient uptake* Allow for use of trips, guest speakers, video calls to enhance the student learning and engagement, for example, fertiliser salesperson, agronomist, explore [Agricultural science careers- a day in the life of a field representative](https://www.careers.govt.nz/jobs-database/farming-fishing-forestry-and-mining/agriculture-horticulture/agricultural-horticultural-field-representative/). **Calendar of operations includes:*** teaching of the [Māori lunar calendar](https://www.youtube.com/watch?v=CGhNt6CCJBc) *–* the [maramataka](https://akojournal.org.nz/2021/01/13/te-maramataka/)
* detail around why, and how, Aotearoa New Zealand horticultural is heavily linked to the seasons of the growing region, such as dormancy in grapes
* planning, as the year progresses, management practices that should be done for a range of production systems. These would provide the prelude to the management practices covered in detail based on the production type and end product of own choosing
* creating a yearly calendar of operations for a horticultural production system – this could be completed throughout the year and could coincide with students completing practical skills (grafting, pricking out, pruning).

**Examining soil as the basis of plant growth** Appreciate the ways life processes and growing environments affect end products of primary production. This includes the **properties of soil** including:* Physical - soil texture and structure
* Chemical - pH and nutrient levels/retention
* Biological - organic matter, living organisms

Consider the issues of saline soils faced by Tongan, Tokelauan, and Kiribati Island nations as [climate change](https://www.youtube.com/watch?v=L-gpHgebunY) brings king tide events onto former arable land.Soil experiments and practical activities to reinforce learning: drainage, texture by sedimentation, digging a hole and looking at soil profiles/organic matter. [Link to New Zealand Soil Classification System](https://www.sciencelearn.org.nz/resources/970-soil-names): Physical, Chemical, and Biological properties of soil. [Soil texture](https://www.sciencelearn.org.nz/resources/919-soil-farming-and-science-introduction) (sand, silt, clay, and texture triangles) and structure. Include soil experiments and practical activities to reinforce learning: drainage, texture by sedimentation, measuring soil pH, digging a hole, for example, and looking at soil profiles. **Soil modification**Consider [soil](https://www.sciencelearn.org.nz/resources/981-visual-soil-assessment) as a living sponge of interconnected [microorganisms](https://www.sciencelearn.org.nz/resources/975-growing-soil-microbes), micro and macro invertebrates, and home to living things [starting with Papatūānuku.](https://www.youtube.com/watch?v=AnOWHeJNbZM) Discuss the use of soil management practices to meet the needs of society *–* primarily used to modify the soil for the benefit of plant growth (adding fertiliser/lime, addition of organic matter, cultivation, crop rotation, drainage, irrigation, effluent application). Investigate the management practices growers use to modify soils and use practical examples where possible. For example: * fertiliser application: observe fertiliser application/soil testing on a local farm, carry out experiments investigating the impact of different nutrients on grass growth
* drainage: research different drainage systems, set up a mini-novaflow system and observe how it impacts water levels in soil
* cultivation: carry out small scale cultivation in a garden or horticulture plot, look at the impacts that different techniques (minimum tillage, crop rotation) have on plant growth.

Link the soil management practice to how it has an impact on the properties of soil, plant growing processes, and product outcomes. For example:* irrigation and photosynthesis: set up different punnets of pasture with different water application rates and measure growth over a period of weeks
* soil temperature (could be linked to aeration, adding organic matter etc): grow crops in different temperatures and look at the different growth rates
* create mind maps to show the links between soil management, soil properties and plant growth
* visit a local farm and look at ways soil and water are modified in that growing environment
* consider the use of raised beds and elevated garden technology used in Pacific Islands to combat salination of soils.

**Plant propagation**Understand the genetic implications of sexual vs asexual propagation and the importance of each. Discuss the industry implications (for example, commercially significant varieties/cultivars).Raise seeds in both containers and directly in the soil – linking the requirements for germination and subsequent growth to the specific conditions provided/ steps carried out.Propagate a range of plant types using appropriate asexual (cuttings, division and so on) propagation techniques. Link the techniques used to the time of year and the plant’s physiological state.**Above ground plant management practices and modification of plant environment** Investigate the management practices used by growers to manage or modify the ‘above ground’ environment of the plant/crop. For example, shelter, training, pest and disease management, weed control and use of protected environments. Link the management practices to the relevant plant processes.Explore the concept of *manaakitanga* and the way it links to agriculture:* define manaakitanga, and what it means in a Māori worldview
* invite local iwi to talk about significance of manaakitanga to agricultural and horticultural production
* discuss the idea of reciprocity and its significance to agricultural and horticultural production systems, for example as how we look after the land and in return, the land feeds us
* investigate the relationships growers need to foster in order to optimise production (soil and pasture, pasture and cattle etc.)
* discuss manaakitanga with local iwi producers and see how this can be done in practice.

**Opportunity for assessment of AS 1.1 Demonstrate understanding of a life process and how it is managed in a primary production system and AS 1.2 Demonstrate understanding of factors that influence the purpose and location of primary production and AS 1.3 Demonstrate understanding of how soil properties are managed in a primary production system.**  | 3 weeks1 week3 weeks2 weeks3 weeks5 weeks |
| Investigate the relevance of agricultural and horticultural production to people and locationUnderstand mātauranga Māori can link people to place of productionUnderstand that place and purpose of production is influenced by interrelated environmental, social, cultural, and economic reasonsExplore roles and career pathways throughout the primary sector  | Agricultural and horticultural science connect people to locations of purposeful production Investigate the contribution agricultural and horticultural production makes to Aotearoa New Zealand export earnings *(note the relative size and value comparisons of agricultural vs horticultural industries).*Identify and locate the main horticultural products and industries in Aotearoa New Zealand.Compare climatic information of regions – sunshine, precipitation, temperature, wind.Investigate the distance to market (endpoint) for a locally produced horticultural product.Investigate [pathways opportunities](https://www.opportunitygrowshere.nz/?gclid=CjwKCAjwoZWHBhBgEiwAiMN66Qhc_5HaOZptn3cfbjPr019d20mzGVediRTOEY7sPqiIJsyzgaBk_RoCp1wQAvD_BwE#industries) directly related to the horticultural industry in Aotearoa New Zealand. Understand how market demands and user preferences can be met through kuleana. This is a good opportunity to bring in guest speakers, organise field trips or site visits, video conferencing with producers, or online media such as [On Farm Story](https://farmersweekly.co.nz/s/on-farm-story).**Māori and European settlement patterns and their relationship to food production** Investigate how values and practices influence ways in which people interact with the environment:* where and when different groups settled in Aotearoa New Zealand – including both Māori and European settlers
* discuss and source information about why most of Aotearoa New Zealand’s towns and cities are located near waterways
* consider Polynesian horticultural enterprises including kūmara and taro in Northland
* consider local iwi industry in specific areas – historic and current settlement areas, reasons why, and use of land
* provide opportunities for kuleana as students bring their own learning to share during classwork.

Understand that purpose of production is influenced by interrelated economic, social, cultural, and environmental reasons. Identify the physical factors of the environment that must be considered for the production of a horticultural product, such as soil, topography, and altitude and how growers can change or modify them. For example, the use of protected environments to produce out of season produce like tomatoes and orchids.Identify the social and economic reasons for the production of a locally produced horticultural product. Investigate the range of employment opportunities created by the production of a locally produced horticultural product.Explore/investigate some horticultural production systems that could be started or developed in the local area, taking into consideration climatic and physical factors that enable or limit production. Use this opportunity to bring in local producers to talk about what is grown where and why, as well as what is not grown where and why. An example, is why wine isn’t produced in the Manawatū. You may also reach out to regional councils, or product associations. **Opportunity for assessment of AS 1.2 Demonstrate understanding of the factors that influence the purpose and location of primary production.**  | 7 weeks |
| Utilise different perspectives that influence primary productionRecognise the importance of environmental, social, cultural, and economic sustainability for production systemsExplore how and why primary production management practices are done as they are | Primary Producers make informed decisions about sustainability **Introduction to the Environment*** define what makes up the environment (Aotearoa New Zealand or Pacific areas) – air, water land/soil and living organisms
* revisit the concepts of *tūhononga* and *manaakitanga* – explore the interrelationships and connections between aspects of the environment (eg healthy waterways are needed for the presence of freshwater organisms)
* [importance of land and water](https://www.learnz.org.nz/water172/bg-standard-f/people-and-water) – Māori values of *tūhononga, manaakitanga, tiakitang*a, and Pacific (*vā)* values around land and water
* engage in practical learning experiences: for example, a stream study in a local environment looking at water quality changes, an estuary study looking at density of organisms, compare soils in different environments.

[**Use of land and waterways**](https://www.sciencelearn.org.nz/image_maps/91-land-use-impacts-on-waterways)* explore [community](https://www.rph.org.nz/public-health-topics/nutrition/community-gardens/) use of land and [waterways](https://www.sciencelearn.org.nz/videos/1989-rivers-and-us-monitoring-our-waterways) – traditional Māori and/or Pacific use, current recreational use, and values such as *tūhonongā, manaakitanga, tiakitanga, vā* around waterways
* explore ways that [primary producers use](https://www.sciencelearn.org.nz/videos/1947-stock-access-to-waterways) land and waterways – and the ways that this use is significant to regions – culturally, economically, and socially.

**Environmental impacts of agricultural and horticultural production*** identify a range of management practices carried out on production systems and their impact – should focus on positive management ([regenerative agriculture](https://www.youtube.com/watch?v=sGGzmKPimq8), [riparian planting)](https://www.youtube.com/watch?v=YNOExshBCcI) and negative impacts (water and soil quality issues) as well as their mitigation (e.g. erosion of hill country mitigated via planting of poplar poles)
* discuss local issues – visit a local primary production system and list/discuss management practices and how they are mitigated or managed
* engage guest speakers – local growers, regional councils – either visits or video conferencing options could be used.

**Stakeholder(s), and perspectives, around environmental impacts** * define what a stakeholder is, with examples for local or regional production systems – for example, debates and issues around Ruataniwha Dam in Hawke’s Bay, dairy farming, and degradation of [Selwyn River](https://www.stuff.co.nz/environment/117963750/where-we-used-to-swim-the-turning-point-for-canterburys-selwyn-river) in Canterbury
* discuss reasons why people hold different viewpoints – mātauranga, beliefs, values, and perspectives – bias and how this impacts [thoughts and actions](https://www.sciencelearn.org.nz/resources/3030-dairy-farming-and-climate-change-a-context-for-learning)
* discuss who should have the final say in decision-making around [environmental issues](https://www.sciencelearn.org.nz/videos/1940-kaitiakitanga) in Aotearoa New Zealand?
* use different primary and secondary sources to identify different values and perspectives that stakeholders have – and the way this informs action/response – in a global and regional setting.

**Part 5: Case Studies: Exam Focus - Apple Production** ***(n.b. this focus will be dependent on the context given for the exam)**** define sustainability, and what sustainability means in an apple-growing context
* brainstorm potential impacts apple production could have on the environment – land/soil, water, air, and micro-organisms
* research and investigate ways that growers minimise their environmental impact
	+ consider the long-term social, environmental, economic, and cultural impacts of their management practices
* explore current environmental considerations apple production systems must comply with. eg spraying restrictions and requirements, water use, frost protection considerations (especially using helicopters)
	+ consider the social, environmental, economic, and cultural impacts
* choose a locally significant horticultural production system and investigate sustainability in that setting.

**Opportunity for assessment of AS 1.4 Demonstrate understanding of sustainability considerations that influence primary production management practices.**  | 8 weeks |