# **CB 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. The course outline 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 |
| Consider microorganisms and the taiao as an interconnected entity and explore the role of microorganisms in the taiao  Explore how mātauranga Māori and Pacific knowledges interact with microorganisms | Learn about the mauri of Lake Waahi and the pūrākau associated with the rohe.  Explore the living things that are interconnected in Lake Waahi linking the roto to the rauropi (plants, animals, and microorganisms).  Explore the interconnectedness of the mauri of living things in Lake Waahi, Raahui Pookeka (Huntly), including humans and microorganisms via field trip and informed by kaumatua.  Apply understanding of the interconnectedness of living things to the whenua and explore the concept of kaitiakitanga as we study the living things in the lake.  Explore how environmental conditions affect microorganism growth in the lake and in the lab.  Investigate how changes in the balance of environmental conditions affect microorganism growth. [Agroecological farming](http://www.maramatanga.co.nz/sites/default/files/project-reports/Indigenous%20Agroecology%20FINAL%20Report%202015-Johnson.pdf) is a good example based on indigenous practices from Māori, Moriori, and Pasifika farming practices.  Students use diagrams, food webs, classification keys or photographs to record findings.  Link to LEARNZ field trips and Science learning Hub for [Lake Restoration studies](https://www.sciencelearn.org.nz/videos/1556-lake-rotorua-water-quality) to see this work in the action and for pathways information about work with Regional Councils. | 4 weeks |
| Investigate how changes in conditions in the taiao affect microorganism growth and the mauri of the taiao, including the role of defences in protecting living organisms against harmful microorganisms  Explore how mātauranga Māori and Pacific knowledges interact with microorganisms  Use knowledge of chemicals and their reactions to inform understanding of the mauri of the taiao and the role of kaitiakitanga  Link quantities and location of chemicals to positive and negative impacts on the taiao | Engage with the concept of kaitiakitanga to explore the mauri of the whenua and how this affects our diverse ecosystem. Relate this to the structures of atoms, ions, molecules, and how these particles behave in the lake water.  Use the concept of Papatūānuku and the relationships of the student group to the lake to consider the particles that make up land, lakes, and the water in the lake. Use the language of chemistry to describe particles of the land and lake and how we are connected to the chemistry and interdependent with the lake and land. Recognise that these particles can also be considered to be chemicals. Examine what makes a chemical ‘good’ or ‘bad’ in terms of a balance in the lake.  Extend this analysis to the food we eat and the items we use every day, which are all made of chemicals.  Investigate the chemistry of ions in solutions by engaging in water testing and filtering. Evaporate water to identify sediments, dissolved nitrates, and phosphates. Invite industry speakers via audio or visual conferencing to speak to ākonga about farming and practices that capture sediments and soluble nutrients.  Use examples of lake water, sediment and any pollutants or rubbish found to explore differences between atoms, ions, and molecules – extend this to polymers.  Link these findings to the cycles of the lake – the carbon, nitrogen, and phosphate cycles to show the cyclic nature of the mauri of the whenua moving through the environment. Engage with [Regional Councils](https://www.waikatodistrict.govt.nz/services-facilities/water/water-supply) for information on wastewater considerations and water management. Link to pathways such as plumbing. Watch a [short video](https://www.careers.govt.nz/jobs-database/construction-and-infrastructure/construction/plumber-gasfitter-and-drainlayer/) profiling this work.  Consider the creation of [Hineahuone](https://teara.govt.nz/en/first-peoples-in-maori-tradition/page-2) from red iron earth. Relate the wisdoms in pūrākau to our interrelation of chemicals around us, such as iron in blood. Test the water pH and compare this to the pH of blood to make connections with the roto or awa.  Recognise that everything is made of chemicals and that we need to be able to be scientific in our thinking about “good” or “bad” chemicals. Develop a point of view about what is “natural” and what is synthetic as it relates to chemicals. Explore advertising claims that are misleading and develop a CRAP detector approach to “chemistry speak” in media.  Describe microorganisms and list examples.  Look at phytophthora that causes [Kauri dieback](https://www.sciencelearn.org.nz/resources/2733-kauri-dieback) as an example of imbalance within an ecosystem. Invite [Te Kura te Kauri researchers and presenters](http://www.tekuraotekauri.nz/) to your kura to engage in their free learning packages.  Place microorganisms in the context of Papatūānuku and where they fit within the concept of living things. Refer to the cycles of the lake, such as carbon cycles, decomposition, nutrient cycling, and the role of microorganisms. | 5 weeks |
| Explore how microorganisms can be beneficial or harmful  Explore how mātauranga Māori and Pacific knowledges interact with microorganisms | Explore food available from the lake and how this can be preserved - explore foods from fungi using Ngā Hekaheka o Aotearoa resources HUIA services.  Explore taonga, such as how [trees communicate](https://www.youtube.com/watch?v=yWOqeyPIVRo) and require an integral [relationship with mycorrhizal fung](https://www.youtube.com/watch?v=Un2yBgIAxYs)i to take up water.  Explore the use of microorganisms in food production and how food can be preserved or can spoil, explore food technologies and hospitality as careers. Invite speakers in person or via video links to talk about food safety in hotels and restaurants, engage with local whānau and discuss how ringawera keep food safe on the marae.  Explore food gathering in Lake Waahi and food preservation locally. Schools not able to visit can ask for Zoom in conversations, commission LEARNZ field trips, or use [Science Learning Hub](https://www.sciencelearn.org.nz/videos/1484-food-safety-personal-hygiene). | 4 weeks |
| Investigate how changes in conditions in the taiao affect microorganism growth and the mauri of the taiao, including the role of defences in protecting living organisms against harmful microorganisms  Explore how mātauranga Māori and Pacific knowledges interact with microorganisms | Study the human body. Include the immune system, antibodies, antigens, and investigate tikanga that keeps us safe from ill health, including [cultural](https://www.sciencelearn.org.nz/videos/1183-manuka-honey-dressings) practices that are important in our hapū.  Explore how microbes can make us sick - consider how we can proactively keep our families well using excellence in hygiene in the home.  Invite health workers and carers into school - or visit these workplaces to note practices that keep people safe - food safety, aged care, nurseries or day care, commercial kitchens, [nurse, doctors,](https://www.sciencelearn.org.nz/videos/1035-science-meets-nursing) COVID-19 testers - consider this an opportunity for pathways education.  Use context-based activities to explore the effect of vaccination on herd immunity, such as measles in Samoa or COVID-19 in Aotearoa New Zealand.  Define antibiotic and investigate the concept of antibiotic resistance as it relates to our community.  Study the effects of colonisation due to loss of connection to whenua and Papatūānuku as microorganisms have [caused massive loss to our people](https://www.who.int/chp/chronic_disease_report/samoa.pdf?ua=1) in both Aoteraoa New Zealand and the Pacific.  **Opportunity for assessment of CB1.1 – Demonstrate understanding of a microorganism in the taiao** | 4 weeks |
| Explore patterns of chemical behaviour in neutralisation, combustion, and precipitation reactions  Make predictions using knowledge of patterns of chemical behaviour in neutralisation, combustion, and precipitation reactions  Investigate the conservation of matter during chemical reactions | Explore neutralisation and precipitation reactions in aqueous solutions, linking to environmental examples, particularly to Lake Waahi. Use this knowledge to make predictions of products in environmental reactions, and link to observations.  Test pH of local and household substances, including Lake Waahi water.  Explore the concept of acids and bases using agricultural or home wastewater examples. Include [rongoā remedies](https://www.healthnavigator.org.nz/health-a-z/r/rongo%C4%81-m%C4%81ori/) – for example, ongaonga affliction.  Learn how farmers and foresters use an understanding of acids and bases (fertilisers, cleaners, and testing runoff).  Consider water treatment as an example of chemicals in the community.  Consider precipitation, flocculation, and recall the work done on the carbon cycle to understand the types of combustion that can produce pollutants or poisons.  Find examples where low doses of chemicals are essential and high doses are lethal in the home, in consumed items and in the community. For example, explore the fluoridation debate in the context of concentration.  Consider an action plan that explores nitrate phosphate sedimentation or pollution of the lake – engage with whānau to inform action. Recognise that these substances do not just ‘go away’ and explore conservation of mass.  **Opportunity for assessment of CB1.2 - Demonstrate understanding of a chemical reaction in the taiao** | 5 weeks |
| Recognise that mauri is present in all matter which exists as particles held together by attractive forces  Compare the structures of atoms, ions, and molecules  Explore patterns in melting / boiling points, conductivity, malleability, solubility, ductility, and hardness of metallic, ionic, molecular, and macromolecular materials  Relate uses of materials to the physical properties of different types of matter  Explore how melting / boiling point and solubility are affected by the relative strength of attractive forces between particles | Explore the concept of kaitiakitanga to explore the mauri of the whenua and how this affects the diverse ecosystem of the local awa and Hakarimata forest classifying chemicals as atoms, ions, or molecules.  Explore chemicals in both the awa and the ngahengahe using the skills gained in terms 1 and 2.  Make or explore models to compare the structures of atoms, ions, and molecules.  The behaviour of ions in solutions are investigated in laboratory practical sessions using chemicals from the classroom and chemicals collected from the rohe.  Explore states of matter and the relationship with melting / boiling points.  Link the use of matter to its properties. What properties make that kind of matter suitable for its use in industry? Identify patterns.  Consider the classification of chemicals found in the rohe. Look for evidence of water pollution – nitrates and phosphates and compare these to other chemicals in the soil and water. Extend this learning to include the relationship between the relative strength of the interactions between different particles, and link these to the properties studied.  Relate learning to the chemicals used in industry. Consider the boiling points of substances and properties of a range of solids (conductivity, solubility, malleability) and why the substances are used in various activities. Examples of activities include dairy farming, horticultural practice, river care, fertiliser manufacture and sales, and gardening practices (for example garden centre salesperson, hairdressing, wastewater management).  Pathways link – invite industry specialists to discuss the importance of understanding chemicals in the environment. Industry examples: dairy farming, river care, fertiliser manufacture, wastewater management.  **Learning covered as part of this unit will contribute to assessment of CB1.4 –Demonstrate understanding of the physical properties of materials in the taiao** | 5 weeks |
| Explore the diverse pathways that have brought people to the Pacific, utilising mātauranga Māori and Pacific knowledges of migration and genealogy so that all students understand their place in New Zealand  Examine the universal nature of the molecular structure of DNA at a basic level and examine the relationship between DNA, chromosomes, genes, and alleles  Explore current uses of genomic information that utilise unique genomes  Consider mutation as a source of variation and explore the importance of variation to living things in a local context  Explore the passing down of DNA through the process of fertilisation, which creates further variation  Use data and information to predict and interpret past and future genetic inheritance and consider how this informs whakapapa | Consider origins of our people and the links to Denisovan gene cassettes spread via Pacific migration resulting in genetic diversity and increased risk of adverse effects of COVID-19 infection.  Consult whānau and explore local knowledge that link whenua and whakapapa. Gather local pūrākau to support understanding of Waikato Awa and Hakarimata.  Consider the student cohort pepeha or ancestral links and [link to the voyages](https://nzhistory.govt.nz/culture/encounters/polynesian-voyaging) their families undertook to reach Aotearoa New Zealand. Relate this to the rohe, including the local Awa and Hakarimata forest.  Consider variation of taonga species and variation in people.  Model the relationship between chromosomes, genes, alleles, and DNA, recalling that both whakapapa and DNA are tapu.  Explore DNA as a universal building block that codes for the proteins that build all living things. Consider this from a holistic perspective: we are all children of Papatūānuku and our molecules were once part of dinosaurs, leaves or birds. Use this to understand the relationship between DNA, chromosomes, genes, alleles, and traits. Explore and classify similarities and differences between taonga species and similarities and differences within hapū or whanau.  Apply the language of genetics to family trees to show the inheritance of traits. Consider mutations that form taonga species.  Relate variation to important conservation species such as kākāpō, takahē, maeha and kōkopu – species of the awa and forest. Explore pathways in [conservation.](https://www.careers.govt.nz/searchresults?tab=jobs&industry%5B%5D=animal-care-and-conservation_conservation) Invite a local possum trapper or conservation worker to speak to ākonga in person or remotely.  Explore examples of genetic diversity and biodiversity that are required to support healthy interconnected environments.  Study fertilisation. Include the haploid nature of gametes and explore the combination of gametes from two parents to create offspring. Use terms such as dominant recessive, homozygous, heterozygous, pure-breeding, and hybrid.  Consider pūrākau that relate to inheritance. Use flow charts to show parental relationships between individuals and groups.  Students explore the concept of genetic fingerprints in terms of ‘bar coding’, phylogenies of COVID-19 virus, paternity testing, inheritance, and everyday examples of genetic technologies at a basic level.  **Opportunity for assessment of CB1.3** – **Demonstrate understanding of genetic variation in relation to whakapapa** | 5 weeks |