**Materials and Processing Technology 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.

Context

Hard Materials

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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 |
| Ākonga will understand how materials and processing practice impacts on people by considering the following mātauranga Māori principles: kotahitanga, whanaungatanga, manaakitanga, kaitiakitanga, and tikangaĀkonga will learn to be respectful and open-minded whilst considering the cultural safety of themselves and othersĀkonga will learn about and understand the safe use of chosen materials, tools, and equipment whilst developing an outcomeĀkonga will consider the impact of the outcome on the end user(s)Explore and apply world views to the development and creation of outcomesExplore tikanga Māori and Pacific materials and processing techniques as a foundation for outcome developmentUnderstand that tikanga influences outcome developmentLearn about traditional and contemporary materials and techniques and how they relate to each otherUnderstand the importance of manaaki whenua (caring for the land), manaaki tangata (caring for the people), and economic factors in sustainable design for generations now and into the futureDevelop auahatanga (innovation) skills through technological practiceDevelop communication skills that support working with othersUnderstand the importance of materials and process selection for performance, aesthetics, and sustainabilityUnderstand, use, rangahau (research), and apply design thinking principles Develop and apply practical skills to solve authentic problems or realise opportunities Understand that outcomes are designed and developed to address a need or opportunity for a person, whānau, or communityUse evaluation to determine an outcome’s fitness for purposeDevelop communication skills that support working with othersExplore and apply world views to the development and creation of outcomesLearn about the impact of and on society of outcome developmentUnderstand the importance of manaaki whenua (caring for the land), manaaki tangata (caring for the people), and economic factors in sustainable design for generations now and into the futureDevelop communication skills that support working with othersĀkonga will learn about and understand the safe use of chosen materials, tools, and equipment whilst developing an outcomeExplore tikanga Māori and Pacific materials and processing techniques as a foundation for outcome developmentUnderstand that tikanga influences outcome developmentLearn about traditional and contemporary materials and techniques and how they relate to each otherExplore planning and testing whilst developing an outcome | Ko tēnei pakiwaitara. Tell me a story.**Overview**Ākonga will use different materials as they experiment through manipulation, transformation, or combination as they understand the propertied and characteristics of materials and develop ahuatanga skills.* Cutting, separating, bending, joining, melting, heating, mixing, shaping, forming etc.
* Tool and machine safety.
* How to mahi tahi to test and trial different materials. Mahi tahi is group co-operation and cohesion that is important for the successful application of kaitiakitanga and the undertaking of a kaitiakitanga activity in the workshop environment.
* Understanding and extracting information related to materials safety and datasheets.

The need or opportunity is introduced and explored.Through this exploration, ākonga will be supported to identify and research a person, whānau, or community they could connect with.* Brainstorm people, whānau, or community who could benefit from an outcome situated around the theme of story/stories.
* Research the identified person, whānau, or community and why they are chosen (need or opportunity).
* Ākonga identify and record the purpose of development, key details from research, and basic contextual requirements.

Develop knowledge of: * materials (wood, plastics, metal, composites, organic)
* joining different materials
* tools, machines, and resources
* workshop health and safety.

Electronics.* Input, process, and output.
* Sensors and actuators.
* Circuit design (putting components together to achieve desired output).
* Measuring key circuit values (voltage, current, resistance, continuity).

Electronics skills.* Use circuit design to model and test inputs and outputs.
* Use sensors to manipulate and transform decisions using actuators.
* Use programming in embedded systems to validate data and use the data for decision making.
* Apply electrical/electronics’ safety.

Ākonga will document: * the results of the manipulation, transformation, or combination of different materials
* the collection and sharing of stakeholder feedback
* an individual reflection on the results of manipulation, transformation, or combination of different materials.

Decision making on:* the results of the manipulation, transformation, or combination of different materials which will inform the development of the need or opportunity (shown in the development of the outcome)
* specifications can be drawn to meet the need or opportunity informed by the materials manipulation.

In the creation of the outcome to address the need or opportunity, ākonga will:* use stakeholder feedback to inform decisions about modifications
* reflect on the success of the outcome
* reflect on how successfully manipulation, transformation, or combination of different materials has been used to determine their properties and characteristics in the development of the outcome
* evaluate how well the final outcome has met the need or opportunity.

This learning will support developing evidence for **AS 1.2 Develop a Materials and Processing Technology outcome by transforming, manipulating, or combining different materials****Identity**Overview of technological practice with the application of a design thinking tool. Ākonga will use technological practice to, develop an outcome that demonstrates identity for a person, whānau, or community group. Possible contexts, needs, opportunities, or issues are explored. Ākonga are guided to develop a brief with specifications for an outcome of their own design.Ākonga will explore initial ideas guided by the brief with specifications.* Ideas informed by relevant research.
* Using drawing/3D model/CAD/simulations.
* Exploring circuits schematics.

Ākonga will develop their design through:* modelling, mock-ups, drawing, or simulations reading
* the use of stakeholder feedback to further develop/inform the ideas
* the use of technological knowledge in the development phase
* the use of characteristics of input sensors and output actuators.

Ākonga will confirm their design.* Make a working drawing (sketch or to scale), circuit diagram, or schematics with component chosen component values.
* List materials or components, quantity and sizes required, and working voltage and current.
* Consider whether, or not the design will address the brief with specifications.
* Wānanga to confirm the design. Wānanga means a conference, meeting, discussing with others in a group setting or forum, or consulting a body of knowledge with peers.

Ākonga will apply knowledge of: * materials (wood, plastics, metal, composites, organic, electronics)
* joining different materials
* tools, machines, and resources
* workshop and electrical health and safety
* stakeholder feedback on the process and tools/machines.

Ākonga will apply techniques required during the construction of their outcome.* Cutting, separating, bending, joining melting, heating, mixing, shaping, forming of components.
* Apply health and safety practices in the workshop environment (tools, materials, components, machinery, and processes).
* Work collaboratively in the workshop environment.
* Refining techniques and processes based on stakeholder feedback from the teacher, other ākonga, whānau, or from testing input sensors and output actuators.
* Take aggregate readings to establish reliability from sensors.
* Constructing circuits.
* Confirm circuit measurements by taking voltage and current readings.

Ākonga will:* test and evaluate the outcome in the situation for design
* seek stakeholder feedback about the outcome
* evaluate the outcome against the brief with specifications to determine fitness for purpose.

This learning will support developing evidence for **AS 1.1 Develop a Materials and Processing Technology outcome for an authentic context****Sustainability**Exploration of sustainability and consideration of the use of materials through kaitiakitanga which includes the sustainable practices of materials selection, economic use of materials, and the disposal of waste materials. What it is and what it looks like in a Hard Materials/Electronics context.Teacher will guide ākonga to learn about local knowledge and understanding of sustainable practices. Ākonga carry out rangahau into possible products, ideas, or opportunities: ongoing research must be present throughout the design process.Ākonga identify a need or opportunity for a person, whānau, or community to inspire a conceptual design.The development of the conceptual design can be done through:* drawing
* modelling
* mock-ups
* digital renderings.

Throughout the development of the conceptual design ākonga will demonstrate understanding of:* the materials selected
* the economic use of materials
* the disposal of waste materials.

They will reflect on how well the design meets the requirements of the end user and improve the design considering these requirements. Throughout the development of a conceptual design the student will explain how their design has been refined in response to sustainable practices and the requirements of the end user. This learning will support developing evidence for **AS 1.3 Demonstrate understanding of sustainable practices in the development of a Materials and Processing Technology design****Testing materials and techniques**Through research a possible need or opportunity is identified.This could be:* part of a larger project, or
* testing materials and techniques in the production of an outcome.

**Stage 1:** Ākonga will investigate relevant materials to test in the development of an outcome to determine the most appropriate physical and functional attributes.Tests could be:* breaking points
* physical properties
* aesthetic properties
* durability
* manipulation
* porosity (in terms applying possible finishes)
* load test
* bend test
* moisture or stain resistance.

Ākonga will document the test results.**Stage 2:** Ākonga will investigate relevant techniques to test in the development of an outcome to determine the most appropriate physical and functional attributes. Tests could be:* heating
* machining
* joining
* staining
* finishing.

Ākonga will document the test results.**Stage 3:** From the test results the ākonga will make informed decisions about one or more materials and techniques that will be fit for purpose in its intended outcome.Techniques could be:* application
* steaming
* pressing
* rolling
* completed by hand or machine
* joining.

Ākonga will document decision making from testing and stakeholder feedback, giving reasoning about why they made their decisions. **Stage 4:** Ākonga will use the results of the testing and stakeholder feedback from more than one source to inform the development of an outcome.Ākonga will use stakeholder feedback to:* improve their outcome
* enhance the development of the outcome.

Purposeful stakeholder feedback may come from:* peers
* teacher
* whānau members
* professionals.

**Stage 5:** Ākonga will evaluate how their decisions throughout the testing and trialling benefited the development of the outcome.Ākonga evaluation should incorporate:* testing results, stakeholder feedback, and decision making
* comparing the results of testing and stakeholder feedback to make decisions about the most appropriate material(s) and techniques to use
* justify how testing, stakeholder feedback and the physical and functional attributes all connect to support making informed decisions that lead to a fit for purpose outcome.

This learning will support developing evidence for **AS 1.4 Demonstrate understanding of materials and techniques for a feasible Materials and Processing Technology outcome** | 10 weeks6 weeks6 weeks This would include a two week in class assessment period for the collection of evidence for AS 92014.6 weeks Includes time (2 weeks) for ākonga to complete the CAA for AS 92015, using evidence gathered during the teaching and learning programme.  |