# **Statistics Level 2 Course Outline 1**

# Guide to aid teacher planning - designed to be printed or viewed in A3, Landscape.

## Purpose

This sample Course Outline has been produced to help teachers and schools understand how the Significant Learning from the Learning Matrix and Achievement standards can be structured within a year-long teaching and learning programme.

Te Moana-nui-a-Kiwa Our Oceans

Wtihin this course, it is encouraged for ākonga to build some mathematical reasoning skills where possible. These could involve looking at exponential and logarithmic functions as they can be used as models to represent the trend of data, gradients as they apply to the related rate of change within a relationship, and any appropriate algebraic manipulation within discussions of theoretical models. Ākonga need to be continually reinforcing their number skills and reasoning so that they are able to gauge the appropriateness and scale of the data they are exploring.

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| **Significant Learning** | **Learning activities and assessment opportunities** | **Duration**  Total of 32 weeks |
| Recognise that data is a taonga by considering:  The cultural and social implications of data acquisition and how this informs its use  The whakapapa of data  Issues of rangatiratanga, ownership, belonging, and sovereignty  Issues of tikanga, ethics, methodologies, privacy, access, and confidentiality  How data can be used to support wellbeing  Make and interpret informal inferences and claims from samples and experiments by:  Selecting, designing, and using appropriate sampling and data collection methods  Making informal sample-to-population inferences from random samples for summary and comparison situations, and discussing claims made from these  Making suggestive inferences based on experiments  Recognising the limitations of the inference | Introduction to Te Moana-nui-a-Kiwa Our Oceans topic  Research project on a chosen ocean and a context to investigate, such as pollution, noise and whales, the health of fish, migration patterns of sharks, tsunamis, or another context. The purpose of this section of learning is to begin to find data, visualisations, and claims, that they can critique.  Within this topic, ākonga should learn about the whakapapa of data, how important it is for this to be respected as they do exploration and analysis, and any tikanga around data collection to ensure that they are accessing and using data appropriately. Include information on how it is sourced, what the original intended use was, who the owner of the data is (how to correctly reference sources could be included). This would also be a great opportunity to explore the data from a mathematical viewpoint, considering mathematical models and equations that may fit.  Ākonga learn about effective (and non-effective) ways to collect or display data based on the information they have found for their own context. This would include sampling methods related to their investigation, and variation and uncertainty. New language: methodology, ethics, quantitative and qualitative data.  Survey methods could be included as a data collection method. For example, ākonga could look at surveys of attitudes to pollution or restrictions on fishing such as the recent rāhui on taking scallops from the Hauraki Gulf.  Learning could include mātauranga Māori concepts such as rāhui, seasonal effects on fishing or travelling via te Moana-nui-a-Kiwa, and kaitiakitanga. Learning associated with how to acknowledge the whakapapa of information should be included here. An example of a student who has information about the Great Pacific Garbage Patch may be encouraged to look at where they think that garbage may be coming from and the significance of this. How would knowing where the garbage come from impact those towns/countries/tangata?  ***This learning is connected mostly to AS 2.4: Demonstrate understanding of the design of statistical investigations, and may provide an opportunity for assessment of AS2.2: Demonstrate understanding of statistical claims*** | 10 weeks |
| Explore datasets with the potential for creativity by:  Cleaning and restructuring data, or creating new data structures  Representing the data in visualisations, such as graphs and infographics  Looking for potential patterns and relationships  Creating a narrative from the data  Making informal conjectures, including informing possible further investigations.  Make and interpret informal inferences and claims about populations from samples and experiments by:  Selecting, designing, and using appropriate sampling and data collection methods  Making informal sample-to-population inferences from random samples for summary and comparison situations, and discussing claims made from these  Making suggestive inferences based on experiments  Recognising the limitations of the inference | Looking at accessible data, such as the data on sharks, penguins, and sea ice available on NZGrapher, ākonga will be shown how to use visualisation tools to display data in new and exciting ways. This will include how to recategorise data, collect new data to add to their databases, and grow a dataset that they will be able to use in their assessment.    Using their displays, they will learn statistical strategies to analyse their graphs to make sense of what their data could be telling them. This should include both the creative exploratory analysis and making inferential statements and claims. As an example, national research on the health of Maui Dolphins could be accessed and claims evaluated using informal confidence intervals. Within this learning, ākonga could be looking at trends and possible equations for relationships, which would include interpretation of concepts such as gradients. ***This learning may provide an opportunity for assessment of AS 2.1: Use statistical enquiry for data exploration and AS 2.2: Demonstrate understanding of statistical claims.***  Conduct a simulation (can be a paired experiment). For a simple paired experiment, learning focus can be on the effects of rubbish on hauora. The link to previous learning is the Garbage Patch and how it is affecting the hauora of the moana. For example, does a clean room tend to affect our ability to complete a task? Results can be analysed and a discussion had about tikanga for running an experiment like that. A simulation repeating results can be conducted using easy to use simulators, and models can be created. | 12 weeks |
| Develop probabilistic thinking, including the use of modelling and distributions, by:  Using their lived and learned experience and knowledge to explore uncertainty, variation, and patterns  Understanding and using risk and relative risk  Exploring models for data, and using probability distributions such as normal and binomial, and discrete random variables  Generating data through designing and conducting simulations  Using representations and key probabilistic concepts | Using models created in simulation, statistical terms will be introduced to describe and use a select group of distributions (main focus here is normal and binomial, but could be extended to uniform if appropriate). Learning may include an introduction to new language such as binomial and new calculations such as those used for the normal distribution. Note that the focus is on using and interpreting the information, not the basic calculations that can easily be done by calculators or computers.    Proportional reasoning (such as risk) will be connected to the findings they discovered in their initial information gathering learning. The teacher may supplement learning with claims they have found in the media and show ākonga how to test the potential accuracy of the claims. Relative risk and pre-CL8 conditional probabilities may be learnt here.    Other data visualisations not covered in earlier learning may fit better here such as trees, tables, Venn diagrams (suggestion that this is only two overlapping circles, with the three circles left for next year), dotplots, bargraphs.  ***This learning is connected mostly to AS2.3: Use probability models and representations to investigate situations.*** | 10 weeks |