Kurri Kurri High School – STEM Faculty – Scope & Sequence – Year 11 Investigating Science - 2022

TERM 1

1	2	3	4	5	6	7	8	9	10	11

Module 1: Cause and Effect - Observing
Outcomes: INS11-8, INS11-1, INS11-2, INS11-3, INS11-4, INS11-5, INS11-6, INS11-7
Content focus:
Observation instigates all scientific experimentation. Investigative scientific processes can only be applied to phenomena that can be observed and measured. Detailed observations motivate scientists to ask questions about the causes and the effects of phenomena they observe. In this way, science continues to progress and enhance the lives of individuals and society by encouraging a continued search for reason and understanding.
Students explore the importance of observation and the collection of quantitative and qualitative data in scientific investigations. They conduct their own practical investigation, either individually or collaboratively, which is used to demonstrate the importance of making detailed and accurate observations, determining the types of variables and formulating testable scientific hypotheses.
Working Scientifically:
Students focus on developing hypotheses that arise from their observations and evaluate these in order to gather, select and process appropriate qualitative and quantitative data. Students should be provided with opportunities to engage with all Working Scientifically skills throughout the course.
Inquiry questions:
Role of Observations - How does observation instigate scientific investigation?
Observations - What are the benefits and drawbacks of qualitative and quantitative observations?
Observations as Evidence - How does primary data provide evidence for further investigation?
Observing, Collecting and Recording Data – How does the collection and presentation of primary data affect the outcome of a scientific investigation?
Conclusions Promote Further Observations - How do conclusions drawn from the interpretation of primary data promote further scientific investigation?
Working Scientifically Skills: Questioning and Predicting, Conducting investigations, Processing Data and Information, Analysing Data and Information, Problem Solving, Communicating
HSC Skills: answering HSC style questions, multiple choice, short answer, long response
Assessment: Data analysis task 40% - term 1 week 6

Module 2: Cause and Effect – Inferences and Generalisations
Outcomes: INS11-9, INS11-1, INS11-2, INS11-3, INS11-4, INS11-5, INS11-6, INS11-7
Content Focus:
Scientific inquiry follows on from humans making inferences and generalisations from commonly held understandings. Such inferences and generalisations have led to a wide range of investigations being performed throughout history, culminating in breakthroughs in scientific understanding. Many hypotheses, when found to be correct, have generated further inquiry and created the need to develop new technologies for further observation. Students consider primary and secondary-sourced data and its influence on scientific investigations. In this module, students engage in gathering primary and secondary-sourced data to assist them in conducting and reporting on investigations, and to further develop their understanding of the central roles of scientific questioning and collaboration in the pursuit of scientific truth.
Working Scientifically:
Students focus on designing and evaluating investigations, drawing inferences, making generalisations, and developing and testing hypotheses through the collection and processing of data. Students should be provided with opportunities to engage with all Working Scientifically skills throughout the course.

1	2	3	4	5	6	7	8	9	10	11
					Data analysis 40%					

TERM 2

1	2	3	4	5	6	7	8	9	10

Module 2: Cause and Effect – Inferences and Generalisations
Outcomes: INS11-9, INS11-1, INS11-2, INS11-3, INS11-4, INS11-5, INS11-6, INS11-7
Inquiry questions:
Observations and Inferences – What inferences can be drawn from observations?
Using secondary sourced data – How is secondary-sourced data used in practical investigations?
Observing Patterns – How does humans' ability to recognise patterns affect the way they interpret data?
Developing Inquiry Questions – How can hypotheses and assumptions be tested?
Generalisations in Science – What generalisations and assumptions are made from observed data?
Peer Review – What role do peers play in scientific investigation?
Working Scientifically Skills: Questioning and Predicting, Processing Data and Information, Analysing Data and Information, Problem Solving, Communicating
HSC Skills: answering HSC style questions, multiple choice, short answer, long response
Assessment:

Module 3: Scientific Models
Outcomes: INS11-10, INS11-1, INS11-2, INS11-3, INS11-4, INS11-5, INS11-6, INS11-7
Content Focus:
Scientific models are developed as a means of helping people understand scientific concepts and representing them in a visual medium. Models are used to make predictions. They may include physical and digital models, which can be refined over time by the inclusion of new scientific knowledge.
Students recognise that many scientific models have limitations and are modified as further evidence comes to light. For this reason, scientific models are continually evaluated for accuracy and applicability by the global scientific community through the process of peer review. Students construct and evaluate their own models, which are generated through practical investigation.
Working Scientifically:
Students focus on designing and evaluating investigations to collect valid and reliable primary and secondary qualitative and quantitative data and apply scientific modelling. Students should be provided with opportunities to engage with all Working Scientifically skills throughout the course.
Inquiry questions:
Models to Inform Understanding – What is a scientific model? What makes scientific models useful?
Types of Models – When should a particular model be used?
Constructing a Model - How can a model be constructed to simplify understanding of a scientific concept?
Working Scientifically Skills: Questioning and Predicting, Processing Data and Information, Analysing Data and Information, Problem Solving, Communicating
HSC Skills: answering HSC style questions, multiple choice, short answer, long response
Assessment: Depth Study – term 2 week 7

Module 4: Theories and Laws

1	2	3	4	5	6	7	8	9	10
						Depth study 30%			

	1	2	3	4	5	6	7	8	9	10
TERM 3	**Module 4: Theories and Laws** **Outcomes:** INS11-11, INS11-1, INS11-2, INS11-3, INS11-4, INS11-5, INS11-6, INS11-7 **Content Focus:** The term 'science' comes from the Latin *scientia*, which means 'a knowledge based on demonstrable and reproducible data'. Reproducible data is used by scientists to develop theories and laws to explain and describe phenomena. Theories provide a coherent understanding of a wide range of phenomena. A law is usually a statement that can be expressed as a mathematical relationship. It describes phenomena in nature, with no exceptions, at a point in time. Testing scientific theories drives scientific breakthroughs and questions current understandings. Students examine how complex models and theories often require a wide range of evidence, which impacts on society and the environment. In this module, students engage in practical and secondary investigations that are related to major theories or laws and their application. **Working Scientifically:** Students focus on analysing and evaluating data to solve problems and communicate ideas about the development of theories and laws. Students should be provided with opportunities to engage with all Working Scientifically skills throughout the course. **Inquiry questions:** *Introduction to Scientific Theories and Laws - What are the differences and similarities between scientific theories and laws?* *Development of a Theory - What leads to a theory being developed?* *Development of Laws – What leads to the acceptance of a scientific law?* *Application of Theories and Laws in Science - How are theories and laws used in science?* **Working Scientifically Skills***:* Questioning and Predicting, Planning investigations, Conducting investigations, Processing Data and Information, Analysing Data and Information, Problem Solving, Communicating **HSC Skills:** answering HSC style questions, multiple choice, short answer, long response **Assessment:** Yearly Examination – Week 8/9 Term 3							Examinations		
									Examination 40%	