

 **Liverpool Girls’ High School**

 *Innovation Excellence Learning*

 **Science ~** Stage 5 Course Outlines

INTRODUCTION TO SCIENCE

*By the end of Stage 5 students:*

* use scientific inquiry by actively engaging in using and applying the processes of Working Scientifically;
* develop their understanding of science ideas and concepts, how scientific knowledge is refined over time and the significance of scientific evidence in evaluating claims, explanations and predictions;
* formulate questions or hypotheses to be investigated scientifically;
* individually and collaboratively plan and safely undertake a range of first-hand;
* design and conduct controlled experiments to collect valid and reliable first-hand data;
* process, analyse and evaluate data and information from first-hand investigations to draw conclusions consistent with the evidence, identifying sources of uncertainty and possible alternative explanations for findings;
* assess the validity and reliability of claims made in secondary sources;
* communicate science ideas for specific purposes and construct evidence-based arguments using appropriate scientific language, conventions and representations;
* apply models, theories and laws to explain phenomena and situations involving energy, force and motion;
* explain the concept of energy conservation, by describing energy transfers and transformations within systems;
* describe changing ideas about the structure of the Earth, origins of the universe and the diversity of life on the Earth;
* explain how scientific understanding has contributed to knowledge about global patterns of geological activity and interactions between global systems;
* analyse interactions between components and processes within biological systems and their responses to external changes;
* use scientific evidence to assess whether claims, explanations and predictions are supported and can be used to evaluate predictions and inform decisions related to contemporary issues;
* explain the organisation of the periodic table, chemical reactions and natural radioactivity in terms of atoms;
* describe how different factors influence the rate of chemical reactions and the importance of a range of types of chemical reactions in the production of substances;
* describe how the values and needs of contemporary society can influence the focus of scientific research and technological development in a variety of areas; and
* outline examples of where the applications of the advances of science, emerging sciences and technologies significantly affect people’s lives, including generating new career opportunities.

COURSE OBJECTIVES AND OUTCOMES

### Values and attitudes

##### *Students:*

* *develop an appreciation of the contribution of science to finding solutions to personal, social and global issues relevant to their lives now and in the future;*
* *develop a willingness to use evidence and reason to engage with and respond to scientific and technological ideas as informed, reflective citizens;*
* *develop interest and positive, informed values and attitudes towards science and technology;*
* *recognise the importance and relevance of science and technology in their lives now and for their future.*

SC5-1VA appreciates the importance of science in their lives and the role of scientific inquiry in increasing understanding of the world around them;

SC5-2VA shows a willingness to engage in finding solutions to science-related personal, social and global issues, including shaping sustainable futures;

SC5-3VA demonstrates confidence in making reasoned, evidence-based decisions about the current and future use and influence of science and technology, including ethical considerations.

### Working Scientifically (Skills)

##### *Students:*

* *develop knowledge, understanding of and skills in applying the processes of Working Scientifically;*
* *develop knowledge, understanding of and skills in applying the processes of Working Technologically;*

SC5-4WS develops questions or hypotheses to be investigated scientifically;

SC5-5WS produces a plan to investigate identified questions, hypotheses or problems, individually and collaborative;

SC5-6WS undertakes first-hand investigations to collect valid and reliable data and information, individually and collaboratively;

SC5-7WS processes, analyses and evaluates data from first-hand investigations and secondary sources to develop evidence-based arguments and conclusions;

SC5-8WS applies scientific understanding and critical thinking skills to suggest possible solutions to identified problems;

SC5-9WS presents science ideas and evidence for a particular purpose and to a specific audience, using appropriate scientific language, conventions and representations.

### Knowledge and understanding

##### *Students:*

* *develop knowledge of the Physical World, Earth and Space, Living World and Chemical World, and understanding about the nature, development, use and influence of science;*
* *develop knowledge of the Natural Environment through understanding about the Physical World, Earth and Space, and Living World;*
* *develop knowledge and understanding of the Natural Environment and the Made Environment through the Material World;*
* *develop knowledge and understanding of the Made Environment through Built Environments, Information and Products;*

SC5-10PW applies models, theories and laws to explain situations involving energy, force and motion;

SC5-11PW explains how scientific understanding about energy conservation, transfers and transformations is applied in systems;

SC5-12ES describes changing ideas about the structure of the Earth and the universe to illustrate how models, theories and laws are refined overtime by the scientific community;

SC5-13ES explains how scientific knowledge about global patterns of geological activity and interactions involving global systems can be used to inform decisions related to contemporary issues;

SC5-14LW analyses interactions between components and processes within biological systems;

SC5-15LW explains how biological understanding has advanced through scientific discoveries, technological developments and the needs of society;

SC5-16CW explains how models, theories and laws about matter have been refined as new scientific evidence becomes available;

SC5-17CW discusses the importance of chemical reactions in the production of a range of substances, and the influence of society on the development of new materials.

**Stage 5 - Year 9 Science**

**Stage 5 - Year 10 Science**

## Science ~ Performance Descriptors

## Areas for Assessment

**Knowing and understanding
Questioning and predicting
Planning and conducting investigations
Processing and analysing data and information
Problem-solving
Communicating**

## Grade A

A student at this grade typically:

* applies extensive knowledge and understanding of scientific models, theories and laws, and about the nature, use and influence of science
* identifies and proposes valid scientific hypotheses, asks questions and makes evidence based predictions
* creates, plans and organises appropriate, risk-assessed, safe, and ethical first-hand scientific investigations both individually and collaboratively
* uses critical thinking skills to evaluate trends, patterns and relationships to draw evidence-based scientific conclusions
* effectively gathers, selects, organises and processes first-hand and secondary sourced data and information to evaluate issues and inform creative solutions using appropriate digital technologies
* communicates comprehensive understanding of scientific ideas, and related evidence for a particular purpose and audience using scientific units, language conventions and text types.

## Grade B

A student at this grade typically:

* applies thorough knowledge and understanding of scientific models, theories and laws, and about the nature, use and influence of science
* identifies and proposes coherent hypotheses, asks questions and makes logical predictions
* plans and organises appropriate, risk-assessed, safe, and ethical first-hand scientific investigations
* uses critical thinking skills to explain trends, patterns and relationships to draw scientific conclusions
* systematically gathers, selects, organises and processes first-hand and secondary sourced data and information to explain issues and inform problem-solving using appropriate digital technologies
* communicates well-developed understanding of scientific ideas to an audience using scientific units and language conventions.

## Grade C

A student at this grade typically:

* demonstrates sound knowledge and understanding of scientific models, theories and laws, and about the nature, use and influence of science
* identifies and proposes related hypotheses, asks questions and make predictions
* plans and performs safe, ethical first-hand scientific investigations
* explains trends, patterns and relationships to draw scientific conclusions
* gathers and selects first-hand and secondary sourced data and information to identify issues and participate in problem-solving using appropriate digital technologies
* communicates sound understanding of scientific ideas to an audience.

## Grade D

A student at this grade typically:

* demonstrates basic knowledge and understanding of scientific models, theories and laws, and about the use and influence of science
* asks questions and makes some predictions
* performs safe, ethical first-hand scientific investigations
* describes trends, patterns and draws some conclusions
* uses first-hand and secondary sourced data and information, and appropriate digital technologies, to assist in the problem-solving process
* communicates basic scientific understanding to an audience.

## Grade E

A student at this grade typically:

* demonstrates elementary knowledge and understanding of some scientific principles, and about some uses of science
* asks questions and attempts prediction
* performs safe, ethical first-hand scientific investigations with guidance
* recounts conclusions
* uses information provided and, with assistance, participates in problem-solving activities
* with guidance, communicates elementary scientific information to an audience.