



HUMAN BIOLOGY

General course

Year 11 syllabus for teaching from 2027

Acknowledgement of Country

Kaya. The School Curriculum and Standards Authority (the Authority) acknowledges that our offices are on Whadjuk Noongar boodjar and that we deliver our services on the country of many traditional custodians and language groups throughout Western Australia. The Authority acknowledges the traditional custodians throughout Western Australia and their continuing connection to land, waters and community. We offer our respect to Elders past and present.

Important information

As part of the Western Australian Certificate of Education (WACE) Refreshment, the School Curriculum and Standards Authority (the Authority) has revised the course rationale and aims, and updated the General Capabilities to create clearer connections with the syllabus content.

This syllabus is effective from 1 January 2027.

Users of this syllabus are responsible for checking its currency.

Syllabuses are formally reviewed by the Authority on a cyclical basis, typically every five years.

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Rationale

The Human Biology General course gives students a chance to explore what it is to be human and covers a wide range of ideas relating to the functioning human body. An understanding of human biology is essential for making informed choices regarding health and lifestyle and contributing effectively to discussions related to health issues in the community.

Students learn about themselves, exploring how body systems work together to ensure efficient body functioning, and how lifestyle choices can affect the body and quality of life. They understand the importance of regular health checks to prevent and manage medical problems.

The course is founded on knowledge and understanding that has been gained through systematic inquiry, scientific research and practical application. Students develop scientific literacy along with a deep understanding of the subject. They are challenged to ask questions and draw evidence-based conclusions using scientific knowledge and practices. Students develop the knowledge and skills to think critically, evaluate evidence, solve problems, and communicate understandings in scientific ways.

Responsible citizens need to be able to evaluate benefits, risks and ethical concerns to make informed decisions about matters relating to lifestyle and health. Issues such as diet, sedentary lifestyle, alternative medical treatments and the use of drugs are examples in which personal choices have an impact on health and wellbeing. With an understanding of human biology, students are able to make better life decisions and to be more informed contributors to the discussions related to health issues in the community.

An understanding of human biology is valuable for a variety of career paths. The course prepares students for further studies and training in the fields of nursing, health (for example, allied health assistance, nutrition, dentistry and pathology collection), food and hospitality, childcare, sport, science education and social work. An understanding of human biology helps to prepare all students, regardless of their background or career aspirations, to take their place as responsible citizens in society.

Aims

The Human Biology General course aims to develop students’:

- use of appropriate terms, conventions and representations to demonstrate understanding of how the structure and function of the human body systems maintain a healthy body
- use of the scientific method for a variety of investigations to demonstrate knowledge of human body systems
- ability to ask questions and draw evidence-based conclusions using scientific knowledge and practices
- application of knowledge to solve problems and make informed decisions that impact on themselves and society
- use of appropriate representations, multimodal mechanisms and platforms to communicate scientific understandings.

Organisation

This course is organised into a Year 11 syllabus and a Year 12 syllabus. The cognitive complexity of the syllabus content increases from Year 11 to Year 12.

Structure of the syllabus

The Year 11 syllabus is divided into two units, each of one semester duration, which are typically delivered as a pair. The notional time for each unit is 55 class contact hours.

Unit 1

This unit explores how the structure and function of cells help to sustain life processes, and the role of the digestive system in providing essential nutrients for the musculoskeletal system. It also explores how the dietary decisions we make can affect the functioning of body cells and our quality of life.

Unit 2

This unit explores circulatory, respiratory and urinary systems, and how they facilitate the exchange, transport and removal of materials for efficient body functioning. It also explores the importance of regular health checks to prevent or manage medical problems.

Each unit includes:

- a unit description – a short description of the focus of the unit
- unit content – the content to be taught and learned.

Organisation of content

The course content is divided into three content areas:

- Scientific method
- Scientific literacy
- Science understanding.

These content areas should be taught in an integrated way. The organisation of the content areas provides an opportunity to integrate content in flexible and meaningful ways.

Scientific Method

The scientific method involves asking questions about the natural and technological world, preparing a plan to collect, process and interpret data, making conclusions, evaluating procedures and findings.

Scientific Literacy

Informed participation in society requires knowledge of relevant science concepts and skills, consideration of ethical implications of science and technological research, and communicate knowledge and findings effectively to appropriate audiences.

Science Understanding

Science understanding is evident when a person selects and integrates appropriate science concepts, models and theories to explain and predict phenomena, and applies those concepts, models and theories to new situations.

The Science Understanding content in each unit develops students' understanding of the key concepts, models and theories that underpin the context being studied.

Progression from the Years 7–10 curriculum

This syllabus continues to develop student understanding and skills from the Years 7–10 Science curriculum: Science Understanding and Science Inquiry.

Representation of the General Capabilities

The General Capabilities encompass the knowledge, skills, behaviours and dispositions that will support students to live and work successfully now and into the future. They are not assessed unless identified within the specified unit content. Teachers should find opportunities to incorporate the following General Capabilities into the teaching and learning program for the Human Biology General course.

Critical and creative thinking

Critical and creative thinking is developed in the course as students use scientific method to construct, review and revise questions and hypotheses and design related investigation methods. Science is a creative endeavour and students devise innovative solutions to problems, predict possibilities, envisage consequences and speculate on possible outcomes as they develop their skills and understanding of the course content. When conducting research, constructing scientific arguments, and drawing and justifying conclusions, students use critical thinking skills to consider the accuracy, validity and relevance of information and opinions. They interpret and evaluate data, interrogate and select evidence, and analyse processes, interpretations, conclusions and claims for validity and reliability, including reflecting on their own processes and conclusions.

Digital literacy

Digital literacy is developed in the course as students use a range of strategies to locate, access and evaluate information from multiple digital sources; to collect, analyse and represent data; to model and interpret concepts and relationships; and to communicate and share science ideas, processes and information.

Literacy

Literacy is developed in the course as students refine their skills and understandings related to the three content areas of the course: Scientific Method, Scientific Literacy and Science Understanding. Students work in groups to plan and conduct investigations. They gather, interpret, synthesise and critically analyse information presented in a wide range of genres, modes and representations, including text, flow diagrams, symbols, graphs and tables. They evaluate information sources and compare and contrast ideas, information and opinions presented within and between texts. They communicate processes and ideas logically and fluently, both orally and in writing. They construct evidence-based arguments, selecting genres and employing appropriate structures and features to communicate for specific purposes and audiences.

Numeracy

Students develop their numeracy in the course as they apply the wide range of skills associated with the Scientific Method content, including making and recording observations; ordering, representing and analysing data; and interpreting trends and relationships. They employ numeracy skills to interpret complex representations, and to appreciate the ways in which human biological systems are structured, interact and change. They engage in analysis of data, including issues relating to accuracy, reliability and probability, and they interpret and manipulate mathematical relationships to calculate and predict values.

Addressing the other General Capabilities

Although the following General Capabilities have not been identified as a focus in the Human Biology General Year 11 syllabus, teachers may find opportunities to incorporate them into the teaching and learning program.

- Ethical understanding
- Intercultural understanding
- Personal and social capability

Such opportunities may occur through the application of different contexts, pedagogical practices and/or assessment strategies that relate to the syllabus as part of the teaching and learning program.

Summary representation of the General Capabilities in the Human Biology General course

The unit content and assessment types for this course provide students with the opportunity to develop the General Capabilities summarised in the table below.

Year	Course	Course type	General Capabilities						
			CCT	DL	EU	IU	L	N	PSC
Year 11	Human Biology (GEHBY)	General	✓	✓			✓	✓	
Year 12	Human Biology (GTHBY)	General	✓	✓			✓	✓	

Key

CCT: Critical and creative thinking, DL: Digital literacy, EU: Ethical understanding, IU: Intercultural understanding, L: Literacy, N: Numeracy, PSC: Personal and social capability

Representation of the Cross-curriculum Priorities

The Cross-curriculum Priorities address the contemporary issues that students face in a globalised world. Teachers may find opportunities to incorporate them into the teaching and learning program for the Human Biology General course. The Cross-curriculum Priorities are not assessed unless they are identified within the specified unit content

Aboriginal and Torres Strait Islander histories and cultures

Contexts that draw on Aboriginal and Torres Strait Islander histories and cultures provide opportunities for students to recognise the importance of Aboriginal and Torres Strait Islander Peoples' knowledge in developing a richer understanding of the health issues of modern Aboriginal and Torres Strait Islander Peoples. Students could examine the ways in which the settlement of Australia by Europeans has impacted on the health and wellbeing of Aboriginal and Torres Strait Islander communities through the introduction of foreign diseases and disorders.

Asia and Australia's engagement with Asia

Contexts that draw on Asian scientific research and development, and collaborative endeavours in the Asia Pacific region, provide an opportunity for students to investigate Asia and Australia's engagement with Asia. Students could examine the important role played by people of the Asia Pacific region in such areas as medicine, biomechanics and biotechnology. They could consider collaborative projects between Australian and Asian scientists and the contribution these make to scientific knowledge.

Sustainability

The Sustainability cross-curriculum priority is not explicitly addressed in the Human Biology General course. The Human Biology General course provides authentic contexts for exploring, investigating and understanding the function and interactions of human body systems across a range of spatial and temporal scales. By investigating the relationships between the systems and system components of the human body, and how systems respond to change, students develop an appreciation for the interconnectedness of the human body to the biosphere, hydrosphere and atmosphere.

Students appreciate that the study of the Human Biology General course provides the basis for decision-making in many areas of society and that these decisions can affect the Earth system. They understand the importance of using science to predict possible effects of an altered environment on the human body, and to develop management plans or alternative technologies that minimise these effects and provide for a more sustainable future.

Safety

Science learning experiences may involve the use of potentially hazardous substances and/or hazardous equipment. It is the responsibility of the school to ensure that duty of care is exercised in relation to the health and safety of all students and that school practices meet the requirements of the *Work Health and Safety Act 2011* (Cth), in addition to relevant state or territory health and safety guidelines.

Animal ethics

Through a consideration of research ethics as part of Science Inquiry Skills, students will examine their own ethical position, draw on ethical perspectives when designing investigation methods, and ensure that any activities that impact on living organisms comply with the *Australian code of practice for the care and use of animals for scientific purposes* (www.nhmrc.gov.au).

Any teaching activities that involve the care and use of, or interaction with, animals must comply with the *Australian code of practice for the care and use of animals for scientific purposes*, in addition to relevant State guidelines.

Mathematical skills expected of students studying the Human Biology General course

The Human Biology General course requires students to use the mathematical skills they have developed through the Years 7–10 Mathematics curriculum, in addition to the numeracy skills they have developed through the Science Inquiry strand of the Years 7–10 Science curriculum.

The scientific method content requires students to gather, represent and analyse numerical data to identify the evidence that forms the basis of scientific arguments, claims or conclusions. In gathering and recording numerical data, students are required to take measurements using appropriate units to an appropriate degree of accuracy.

It is assumed that students will be able to competently:

- perform calculations involving addition, subtraction, multiplication and division of quantities
- perform approximate evaluations of numerical expressions
- express fractions as percentages, and percentages as fractions
- calculate percentages
- recognise and use ratios
- comprehend and use the symbols/notations $<$, $>$, Δ , $\approx$
- translate information between graphical, numerical and algebraic forms
- distinguish between discrete and continuous data and then select appropriate forms, variables and scales for constructing graphs
- construct and interpret frequency tables and diagrams, pie charts and histograms
- describe and compare data sets using mean, median and range
- interpret the slope of a linear graph.

Unit 1

Unit description

The focus for this unit is on the nutritional choices that we make for the optimal functioning of body cells.

Cells are the basic structural and functional units of the human body. Nutrients are required by cells to sustain life processes. The structures of the digestive system are designed to obtain nutrients which are essential for a functioning musculoskeletal system. Personal dietary decisions can affect the optimal functioning of body cells and quality of life.

Students investigate and model cell processes through practical activities. They explore the digestive and musculoskeletal systems through real and virtual dissections. Students analyse and evaluate various diets against the *Australian Dietary Guidelines*. They are encouraged to use information and communication technology to gather and interpret data, and communicate their findings in a variety of ways.

Unit content

Each unit includes the knowledge, understandings and skills described below.

Scientific Method

- research a given topic and construct questions for investigation
- design scientific investigations, including the formulation of investigable questions and/or hypotheses, materials required, procedures to be followed to collect valid and reliable data, and identification of safety and ethical considerations
- conduct risk assessments to identify potential hazards and prevent potential incidents and injuries
- use equipment and techniques safely, competently and methodically for the collection of valid and reliable data, and use equipment with precision, accuracy and consistency
- represent qualitative and quantitative data in meaningful and useful ways, including the construction of appropriately labelled tables, processing quantitative data using appropriate mathematical techniques and units, and draw appropriate graphs
- analyse data to identify and describe patterns and relationships and recognise errors and limitations in data
- draw conclusions consistent with the evidence and relevant to the question being investigated
- evaluate the investigative procedure, including the relevance, accuracy, validity and reliability of data, and suggest improvements

Scientific Literacy

- distinguish between opinion, anecdote and evidence, and scientific and non-scientific ideas
- identify examples of where the application of scientific knowledge may have beneficial, harmful and/or unintended consequences
- communicate information and ideas in a variety of ways using scientific conventions and terminology, including the selection and presentation of data and ideas to convey meaning to selected audiences in written, oral and multimedia formats

Science Understanding

Introduction

- all living things carry out the life processes of respiration, feeding, excretion, movement, reproduction, responding to stimuli and growth
- the body has a hierarchical structural organisation of cells, tissues, organs and systems
- body cells contain specialised structures with specific functions, including the nucleus, mitochondria, cytoplasm and cell membrane

Digestive system

- nutrients (carbohydrates, proteins, lipids, vitamins, minerals and water) are compounds in foods essential to life and health that provide energy, the building blocks for repair and growth, and substances necessary to regulate chemical processes
- the structures of the digestive system facilitate the breakdown of food to compounds that can be readily absorbed into the blood for use by cells
- mechanical digestion is required to reduce the size of food pieces and to increase the surface area on which chemical digestion can act
- chemical digestion involves the use of enzymes (amylase, protease and lipase) to chemically break down food for absorption; enzymes have optimal pH and temperature ranges
- absorption from the small and large intestine involves the transport of materials (diffusion, osmosis and active transport) into the blood and lymph
- materials eliminated from the digestive system include indigestible contents, excess materials and some metabolic wastes
- the function of the digestive system can be compromised by diseases and conditions that reduce the efficiency of digestion or absorption of food

Dietary decisions

- the Australian Dietary Guidelines and the Australian Guide to Healthy Eating provide advice for health and wellbeing
- food labels assist with informed food purchases, healthier eating choices and protect public health and safety
- dietary choices can be influenced by various factors including food intolerances, food allergies, diseases, disorders, ethical values and sociocultural factors

Musculoskeletal system

- the support and movement of the body is facilitated by the five functions of the skeletal system (support, movement, protection, production of blood cells, storage of minerals) and the macroscopic structure of long bones
- the location and structure of joints in the skeleton (fixed, slightly movable, freely movable) allow for a range of movement
- skeletal muscles work in groups around joints to bring about flexion and extension
- damage to muscles, bones and joints could be due to movements beyond the capabilities of the musculoskeletal system

Unit 2

Unit description

The focus of this unit is on the importance of regular health checks to prevent or manage medical problems.

The circulatory, respiratory and urinary systems facilitate the exchange, transport and removal of materials for efficient body functioning. Regular health checks can assess the risk of future medical issues and monitor current medical problems for the development of individual treatment to improve quality of life.

Students investigate blood pressure, heart rate, blood oxygen levels and lung capacity through practical activities. They explore the circulatory, respiratory and urinary systems through real and virtual dissections. Students analyse data from blood and urine samples to detect anomalies. They are encouraged to use information and communication technology to gather and interpret data, and communicate their findings in a variety of ways.

Unit content

Each unit includes the knowledge, understandings and skills described below.

Scientific Method

- research a given topic and construct questions for investigation
- design scientific investigations, including the formulation of investigable questions and/or hypotheses, materials required, procedure to be followed to collect valid and reliable data, and identification of safety and ethical considerations
- conduct risk assessments to identify potential hazards and prevent potential incidents and injuries
- use equipment and techniques safely, competently and methodically for the collection of valid and reliable data
- represent qualitative and quantitative data in meaningful and useful ways, including the construction of appropriately labelled tables, processing quantitative data using appropriate mathematical techniques and units, and draw appropriate graphs
- analyse data to identify and describe patterns and relationships and recognise errors and limitations in data
- draw conclusions consistent with the evidence and relevant to the question being investigated
- evaluate the investigative procedure, including the relevance, accuracy, validity and reliability of data, and suggest improvements

Scientific Literacy

- distinguish between opinion, anecdote and evidence, and scientific and non-scientific ideas
- identify examples of where the application of scientific knowledge may have beneficial, harmful and/or unintended consequences

- communicate information and ideas in a variety of ways using scientific conventions and terminology, including the selection and presentation of data and ideas to convey meaning to selected audiences in written, oral and multimedia formats

Science Understanding

Introduction

- the purpose of regular health checks is to check for current or emerging medical concerns, assess the risk of future medical issues and prompt the maintenance of a healthy lifestyle
- undertaking regular health checks assists in the early detection of medical problems and increases the chances for effective treatment
- diagnosis of a medical problem leads to the development of individual treatment plans

Circulatory system

- the transport of materials around the body is facilitated by the structures of the circulatory system
- the structure of the heart facilitates the efficient flow of blood around the body
- the blood vessels have specialised structures that enable efficient distribution of blood around the body
- the blood is made up of plasma, blood cells (red and white) and platelets, each with particular functions
- the removal of toxins and maintenance of healthy blood sugar levels are two of the many important functions performed by the liver
- measuring blood pressure and heart rate and blood tests provide information about circulatory system health and blood tests provide information about liver health
- the function of the circulatory system can be compromised by cardiovascular diseases
- the function of the liver can be compromised by disease associated with excessive alcohol intake

Respiratory system

- exchange of gases between the external environment and the blood is facilitated by the structures of the respiratory system
- the mechanics of breathing help to maintain the efficient exchange of gases in the lungs
- spirometry*, pulse oximetry and the use of stethoscopes provide information about respiratory system health
- the function of the respiratory system can be compromised by diseases and conditions that reduce the efficiency of gas exchange

* Use of spirometers by students in practical activities is not recommended by Asthma WA.

Urinary system

- the removal of excess water, metabolic wastes and toxins from the blood is facilitated by the structures of the urinary system (details of filtration, reabsorption and secretion processes not required)
- urinalysis is a set of screening tests that help diagnose conditions such as urinary tract infections, kidney disorders and diabetes
- dysfunction of the kidneys may result in serious illness due to accumulation of toxic substances in the blood

Assessment

Assessment is an integral part of teaching and learning that at the senior secondary years:

- provides evidence of student achievement
- identifies opportunities for further learning
- connects to the standards described for the course
- contributes to the recognition of student achievement.

Assessment for learning (formative) and assessment of learning (summative) enable teachers to gather evidence to support students and make judgements about student achievement. These are not necessarily discrete approaches and may be used individually or together, and formally or informally.

Formative assessment involves a range of informal and formal assessment procedures used by teachers during the learning process in order to improve student achievement and to guide teaching and learning activities. It often involves qualitative feedback (rather than scores) for both students and teachers, which focuses on the details of specific knowledge and skills that are being learnt.

Summative assessment involves assessment procedures that aim to determine students' learning at a particular time, for example when reporting against the standards, after completion of a unit/s. These assessments should be limited in number and made clear to students through the assessment outline.

Appropriate assessment of student work in this course is underpinned by reference to the set of pre-determined course standards. These standards describe the level of achievement required to achieve each grade, from A to E. Teachers use these standards to determine how well a student has demonstrated their learning.

Where relevant, higher-order cognitive skills (e.g. application, analysis, evaluation and synthesis) and the General Capabilities should be included in the assessment of student achievement in this course. All assessment should be consistent with the requirements identified in the course assessment table.

Assessment should not generate workload and/or stress that, under fair and reasonable circumstances, would unduly diminish the performance of students.

School-based assessment

The *Western Australian Certificate of Education (WACE) Manual* contains essential information on principles, policies and procedures for school-based assessment that must be read in conjunction with this syllabus.

School-based assessment involves teachers gathering, describing and quantifying information about student achievement.

Teachers design school-based assessment tasks to meet the needs of students. As outlined in the *WACE Manual*, school-based assessment of student achievement in this course must be based on the Principles of Assessment:

- Assessment is an integral part of teaching and learning
- Assessment should be educative
- Assessment should be fair
- Assessment should be designed to meet its specific purpose/s
- Assessment should lead to informative reporting
- Assessment should lead to school-wide evaluation processes
- Assessment should provide significant data for improvement of teaching practices.

Summative assessments in this course must:

- be limited in number to eight tasks
- allow for the assessment of each assessment type at least once over the year/pair of units
- have a minimum value of 5 per cent of the total school assessment mark
- provide a representative sampling of the syllabus content.

Assessment tasks not administered under test or controlled conditions require appropriate authentication processes.

The table below provides details of the assessment types and their weighting for the Human Biology General Year 11 syllabus.

Assessment table – Year 11

Type of assessment	Weighting
Investigation (minimum of 10 hours in class per unit) One investigation should be conducted in each unit and each investigation should have equal weighting. An investigation follows the scientific method, where students modify one or more practical activities in order to investigate a specific question through the collection and analysis of primary data. Students work individually or in groups to plan and conduct the investigation. Each student will prepare a written report to communicate their findings. Planning, working safely and group contributions could be monitored via student logbooks/journals, responses to reflection questions, teacher observations and/or peer assessment.	40%
Project (minimum of 5 hours in class per unit) One project should be conducted in each unit and each project should have equal weighting. A project involves students selecting and exploring a condition, disease, treatment and/or innovation related to the context they are studying. Students are required to analyse and synthesise information from a variety of sources to explain the relevant scientific concepts involved, and describe its impact and/or influence on society. Students will communicate their findings to selected audiences in written, oral and/or multimedia formats (e.g. a scientific article, infographic, animation or vlog).	30%
Practical assessment (maximum of 1 hour in class per unit) One practical assessment should be conducted in each unit and each practical assessment should have equal weighting. Practical work helps develop technical and scientific skills, and improves scientific understanding. A practical assessment enables students to demonstrate their skills in the use of apparatus to collect data and model science concepts relevant to the context they are studying. Students will demonstrate their ability to work safely, manipulate apparatus and take accurate readings. Students may also demonstrate their ability to process and analyse data.	10%
Supervised written assessment (maximum of 1 hour in class per unit) One supervised written assessment should be conducted in each unit and each supervised written assessment should have equal weighting. A supervised written assessment contains one or more items. The items might be in response to stimulus materials, which may be seen or unseen, or questions which should be unseen prior to the administration of the assessment. Items may include: • Short answer questions requiring students to provide single word, sentence or short paragraph responses; construct, use, interpret or analyse secondary data, graphs, tables or diagrams; and/or perform mathematical calculations. • Extended answer questions requiring students to provide responses making connections, drawing conclusions, constructing arguments, analysing and/or evaluating information. The responses may incorporate labelled diagrams or tables with explanatory notes.	20%

Teachers must use the assessment table to develop an assessment outline for the pair of units (or for a single unit where only one is being studied).

The assessment outline must:

- include a set of assessment tasks
- include a general description of each task
- indicate the unit content to be assessed
- indicate a weighting for each task and each assessment type
- include the approximate timing of each task (for example, the week the task is conducted, or the issue and submission dates for an extended task).

Reporting

Schools report student achievement, underpinned by a set of pre-determined standards, using the following grades:

Grade	Interpretation
A	Excellent achievement
B	High achievement
C	Satisfactory achievement
D	Limited achievement
E	Very low achievement

The grade descriptions for the Human Biology General Year 11 syllabus are provided in Appendix 1. They are used to support the allocation of a grade. They can also be accessed, together with annotated work samples, on the course page of the Authority website at www.scsa.wa.edu.au.

To be assigned a grade, a student must have had the opportunity to complete the education program, including the assessment program (unless the school accepts that there are exceptional and justifiable circumstances).

Refer to the *WACE Manual* for further information about the use of a ranked list in the process of assigning grades.

The grade is determined by reference to the standard, not allocated on the basis of a pre-determined range of marks (cut-offs).

Appendix 1 – Grade descriptions Year 11

A	Scientific method - Propose investigable questions and hypotheses that can be tested. - Constructs sequential and reproducible procedures to provide a clear and logical plan to collect valid and reliable data. - Develops and follows risk assessments that relate the hazard, risk and management strategy. - Uses equipment and techniques safely and accurately to collect valid and reliable data. - Organises data logically and presents it in a range of forms using correct conventions, including appropriate graphs and tables, to show patterns and relationships. - Solves calculations and expresses answers using correct units. - Analyses experimental data to describe patterns and relationships and recognises any errors and/or inconsistencies in data. - Links and explains patterns and relationships using relevant science understanding. - States and justifies conclusions consistent with the data and identifies whether conclusions support the hypothesis and/or answers the question being investigated - Describes the validity and reliability of procedures, identifies inconsistencies in data, and suggests relevant improvements to the design of the investigation.
	Scientific literacy - Contrasts scientific and non-scientific ideas. - Presents scientific evidence to explain impacts and claims. - Communicates information and concepts logically, using correct scientific language, conventions and representations.
	Science understanding Explains relationships between structures, systems and processes, using supporting examples.

B	Scientific method - Propose investigable questions and hypotheses. - Constructs sequential procedures, that lack some detail, to collect valid and reliable data. - Develops and follows risk assessments that lack some detail. - Uses equipment and techniques safely and accurately to collect data, most of the time. - Organises data logically and presents it in a range of forms using most conventions correctly, including appropriate graphs and tables, to show patterns and relationships. - Solves calculations and expresses answers using correct units, with only minor errors. - Analyses data to describe and briefly explain patterns and relationships and recognise any inconsistencies in data. - Links and briefly explains patterns and relationships using relevant science understanding. - States conclusions consistent with the data and identifies whether the conclusions support the hypothesis and/or answers the question being investigated. - States difficulties experienced in conducting the investigation or inconsistencies in data and suggests general improvements to the design of an investigation.
	Scientific literacy - Contrasts scientific and non-scientific ideas. - Links scientific evidence to impacts and claims. - Communicates information and concepts using scientific language, conventions and representations.
	Science understanding Describes structures, systems and processes using supporting examples.

C	Scientific method - With guidance, proposes investigable questions and hypotheses that align with the investigation. - Constructs procedures that can be followed to collect appropriate data. - Identifies and follows strategies to prevent incidents and injuries. - Uses equipment and techniques safely to collect data. - Presents data using tables and graphs. - Solves calculations with errors. - Describes patterns and relationships in data. - Attempts to explain patterns and relationships using science understanding. - States conclusions consistent with the data. - States difficulties experienced in conducting the investigation or states general improvements.
	Scientific literacy - Identifies scientific and non-scientific ideas. - Presents scientific evidence without linking to impacts and claims. - Communicates information and concepts using some scientific language and representations, making some errors in the use of conventions.
	Science understanding Identifies and describes some structures, systems and processes.

D	Scientific method - Follows procedures to collect appropriate data. - Follows provided strategies to prevent incidents and injuries. - Follows directions for the safe use of equipment and techniques. - With support presents data using tables and graphs. - Performs calculations that contain many errors or are not attempted. - Incorrectly identifies, or overlooks, patterns and relationships. - Offers simple conclusions not supported by evidence. - States irrelevant suggestions to improve the investigation.
	Scientific literacy - Incorrectly or inconsistently identifies scientific and non-scientific ideas. - Incorrectly or inconsistently presents scientific evidence. - Communicates information and concepts using everyday language and simple representations.
	Science understanding Identifies some structures and systems.
E	Does not meet the requirements of a D grade and/or has completed insufficient assessment tasks to be assigned a higher grade.

* These grade descriptions will be reviewed at the end of the second year of implementation of this syllabus.

Appendix 2 – Glossary

This glossary is provided to enable a common understanding of the key terms in this syllabus.

accuracy

How close a measurement is to the true or acceptable value.

analyse

Consider in detail for the purpose of finding meaning or relationships, and identifying patterns, similarities and differences.

anecdote

A personal account of an event or incident to illustrate a point.

anomaly

Data point not consistent with the expected pattern or relationship.

argue

Make a case, based on appropriate evidence, for and/or against some given point of view.

argument

A claim justified with reference to evidence; scientific arguments are contestable.

claim

An assertion that something is true.

column graph

A graph for organising and displaying discrete data.

compare

Show how things are similar and different.

conclusion

A judgement based on evidence.

continuous data

Quantitative data with a potentially infinite number of possible values along a continuum.

contrast

Show how things are different or opposite.

control

The sample in the investigation that the other samples are compared to.

controlled variable

A variable that is kept constant (or changed in constant ways) during an investigation.

data

A general term for a set of observations or measurements collected during an investigation.

dependent variable

A variable that changes in response to changes to the independent variable in an investigation.

describe

Provide characteristics and features.

design

Plan and evaluate the construction of a product or process, including an investigation.

digital tools

Digital hardware, software, platforms and resources used to develop and communicate learning, ideas and information.

discrete data

Quantitative data consisting of a number of separate values where intermediate values are not permissible.

discuss

Talk over; identify issues and provide points for and/or against.

draw (conclusion)

Come to a conclusion based on evidence.

ethical

Principles, values and beliefs such as right, wrong, honesty, integrity, justice, equality, freedom, respect, truth, fairness, tolerance and loyalty.

evidence

Data that is considered reliable and valid, and that can be used to support a particular idea, conclusion or decision.

evaluate

Examine and judge the merit or significance of something, including processes, events, descriptions, relationships or data.

explain

Relate cause and effect; make the relationships between things evident; provide why and/or how.

explanation

An account of a phenomenon through descriptive statements about how that phenomenon came to be.

extrapolate

Infer from what is known.

fair test

An investigation where one variable (the independent variable) is changed and all other conditions (the controlled variables) are kept the same; the dependent variable is what is measured or observed.

graph

A visual representation of the relationship between quantities plotted with reference to a set of axes.

hazard

Something that has the potential to do harm, such as boiling water splashing out of a beaker.

hypothesis

A tentative idea or explanation for an observation, which can be tested and either supported or refuted by investigation. For example, enzymes work best at 37 °C.

identify

Recognise and name.

illustrate

Similar to 'explain', but requires the quoting of specific examples or statistics, or possibly the drawing of maps, graphs, sketches etc.

impact

The influence or effect on a situation, community or person.

interpret

Draw meaning from.

independent variable

A variable that is changed in an investigation to see what effect it has on the dependent variable.

inference

An informed guess or logical conclusion based on previous experiences, observations and knowledge.

investigable question

A question that leads to a practical investigation through the collection of qualitative and/or quantitative data, such as 'How does temperature affect enzyme activity?'

investigation

A scientific process of answering a question, exploring an idea or solving a problem that requires activities such as planning, collecting and interpreting data and forming a conclusion.

justify

Support an argument or conclusion; give reasons for your statements or comments.

label

Identify by placing a name or word used to describe the object or thing.

line graph

A graph for organising and displaying continuous data, representing the relationship between two variables.

list

Provide a series of related words, names, numbers or items that are arranged one after the other.

model

A representation that describes, simplifies, clarifies or provides an explanation of the workings, structure or relationships within an object, system or idea.

modify

Alter; change the form or quality.

name

Provide a word or term used to identify an object, person, thing, place etc.

non-scientific ideas

Ideas formed from tradition, beliefs or personal experience.

observable

Something that can be seen, heard, felt, tasted or smelled either directly by an individual or indirectly by a measuring device, such as a ruler, camera or thermometer.

observation

A representation of something that has been seen, heard, felt, tasted or smelled either directly by an individual or indirectly by a measuring device, such as a ruler, camera or thermometer.

opinion

A personal view or judgement.

organise

Order or arrange systematically.

outlier

A data point that is far from other data points in a set of data.

outline

Sketch in general terms; indicate the main features of.

pattern

A repeated occurrence or sequence.

pose

Put forward a question for consideration or investigation.

precision

How close two or more measurements are to each other, regardless of whether those measurements are accurate.

prediction

A suggestion of what might happen based on observations. For example, if exercise increases then heart rate will increase.

primary data

Data collected directly by a person or group.

primary source

Information created by a person or persons directly involved in a study or observing an event.

propose

Put forward for consideration or action, such as a point of view, idea, argument or suggestion.

qualitative data

Information that is not numerical in nature.

quantitative data

Numerical information.

reflect on

Think carefully about something, such as past experiences, activities or events.

relate

Identify connections or associations between ideas or relationships or between components of systems and structures.

relationship

A connection or association between ideas or between components of systems and structures.

reliability

The extent to which repeated observations and/or measurements taken under identical circumstances will yield similar results.

repeatable investigation

An investigation that produces the same results when repeated by the original researcher using the same method and equipment.

repeat trial

A test within an experimental investigation that is carried out more than once under the same set of conditions.

reliable data

Data that have been judged to have a high level of reliability.

replicable data

Data that are able to be reproduced exactly.

replicate

An independent experiment that uses the same method in order to validate findings.

represent

Method for presentation of data.

representation

The means by which science ideas and explanations are understood and communicated. Representations can take many different forms or modes.

reproducible investigation

An investigation that produces similar results when repeated by other researchers using the same method and equipment.

research

Locate, gather, record and analyse information in order to develop understanding.

risk

The chance that somebody could be harmed by the hazard.

risk assessment

The identification and prevention of possible hazards involved in experiments or other activities.

scientific ideas

Ideas grounded in measurable and observable data gathered through observation or experimentation.

secondary data

Data collected by a person or group other than the person or group using the data.

secondary source

Information that has been compiled from primary sources by a person or persons not directly involved in the original study or event.

simulation

A representation of a process, event or system that imitates the real situation.

sustainable

Supports the needs of the present without compromising the ability of future generations to support their needs.

table

An arrangement of data or observations in rows and columns.

trend

General direction in which something is changing.

uncertainty

A situation in which something is not known or certain.

validity

The extent to which tests measure what was intended; the extent to which data, inferences and actions produced from tests and other processes are accurate.

variable (experimental)

A factor that can be changed, kept the same or measured in an investigation, such as time, distance, light or temperature.

